

Manufacturers Record

SCIENCE AND INDUSTRY

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Sabotaging the Defense Effort

Labor strikes are a most destructive form of sabotage in the National Defense Program.

Some of the current strikes have extended through weary weeks with millions of man-hours of productive effort lost. Others of far-reaching effect, notably in the steel industry, are threatened.

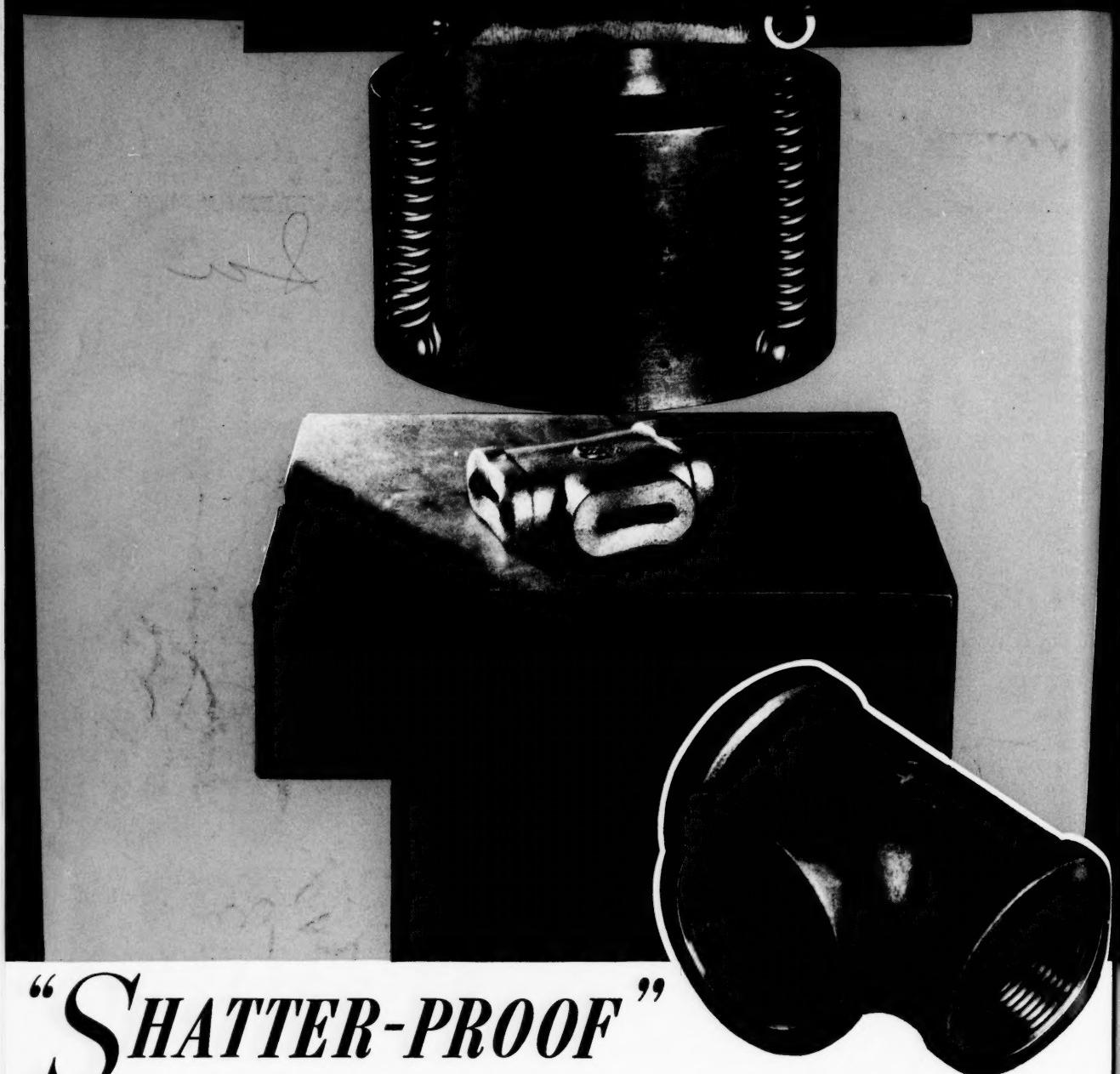
For months the searching spotlight of national publicity has been turned upon business and its responsibilities for national defense.

Is it not timely to portray with the same inexorable emphasis to the American public the motives of the leaders of America's biggest business "LABOR"?

Can't we learn the lesson of France before it is too late?

We cannot afford to temporize with subversive influences which threaten the very form of government we are preparing to fight for.

MARCH 1941



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AIR-FURNACE MALLEABLE IRON FITTINGS BY

GRINNELL
WHENEVER PIPING IS INVOLVED

TABLE OF CONTENTS

MARCH, 1941

Volume 110, Number 3

EDITORIALS

Sabotaging the Defense Effort	Cover
Defense Will Cost Enough—Stop Unnecessary Spending	19

FEATURE ARTICLES

Fifty Years of Manufactured Abrasives	20
Plastics from Bagasse and other Agricultural Residues by S. J. Aronovsky & T. F. Clark	22
Rubber, Natural and Synthetic by J. W. Schade	26
Government Regulation of Business by Roy W. Johns	28
Natural Gas Companies Report Gas Engine Use by Industry Doubled Since 1936	29
\$16,000,000 Steel Mill for Texas	30
Bethlehem Expands Rod Mill at Maryland Plant	31
Martin Expansion to Raise Bomber Output Five Times	32
Industrial Production Trends	34
Modernizing Living Conditions in a Coal Mining Town by H. O. Zimmerman	38
National Defense Program Awards in the South	40
Two Months Total High as February Contracts Soar	42
New Plants and Expansions in the South During February 1941	44
Nation's First Completed Air Base at Savannah by J. H. Cobb, Jr.	56

DEPARTMENTS

New Methods and Equipment	46
Industrial News	52
Trade Literature	54
Index for Buyers	74
Index of Advertisers	76

MANUFACTURERS RECORD

Devoted to the Upbuilding of the Nation Through the Development of the South and Southwest as the Nation's Greatest Material Asset

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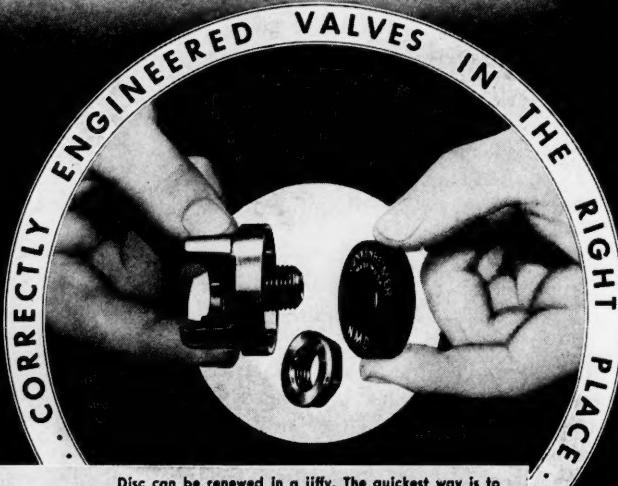
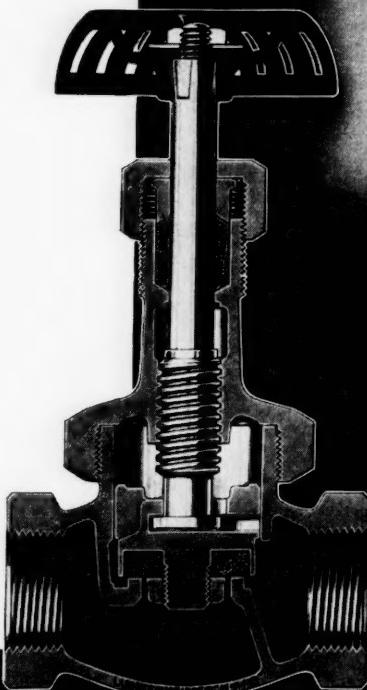
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slightly opening the valve prevents disc holder from dropping off stem when disassembling valve. Entire trimming assembly can be held in one hand.

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DEFENSE WILL COST ENOUGH — STOP UNNECESSARY SPENDING

In 1933 the deficit of the Federal Government was \$1,500,000,000; in 1941 it is estimated it will run over \$6,000,000,000, and next year probably increase to more than \$8,000,000,000. Expenditures for defense are likely to go over \$30,000,000,000.

We are dealing in sums that are staggering in their immensity. Taxation may increase almost to confiscation before the bill is paid. One highly placed government economist has proposed various plans that would reach out for people's savings in banks or wherever they may be.

Those who believe in no way out except more and more spending regardless of consequences, now hope for government regulation of life insurance companies, whose assets long have been tempting to the deficit spenders of the New Deal.

Agreeing, as a majority of Americans do agree, with giving Britain every aid we can spare in her fight for life, we believe it is vital to consider where other expenditures not *absolutely* essential may be stopped.

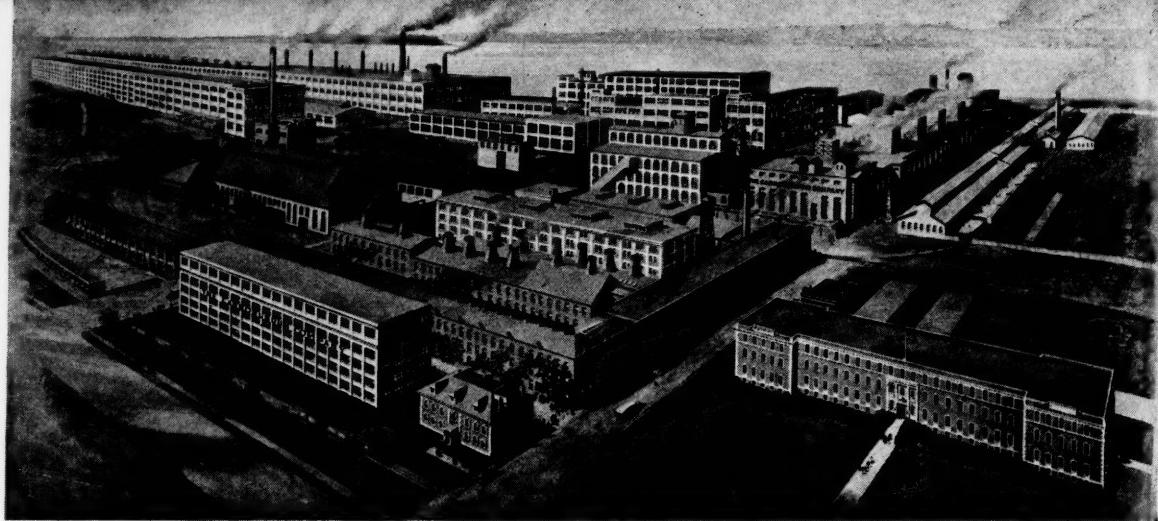
Billions have been spent in recent years for objectives which the record shows by no means solved the problems they were supposed to solve. They have created an army of jobholders and a bu-

reaucracy that clutters Washington and other cities throughout the country.

In the light of what this country is trying to do, there will be beyond doubt work for every able-bodied man who is willing to work, but unemployment benefits it appears must keep on. Farmers, who have been the fair-haired boys of politicians always, and among whom unfortunately there are more than a few willing to take government hand-outs at the expense of the hard pressed taxpayers while neglecting to raise even their own food supplies, must be looked after without abatement in the largess that goes to them.

It is no wonder that a considerable class in this country feel it is their right to receive money from government for doing nothing. There has been a lot of folly, most expensive folly, carried on with the excuse that there must not be lost to the so-called submerged third the continuance of the donations a benevolent government has given them in the last seven or eight years.

The country is arming for defense and every sane person knows that it is unnecessary and wicked, while doing this necessary work, to fail to give due consideration to the national economy that will be smashed if we don't take thought of what is to come later on. If we continue the present extravagant course we will, in the end, meet the inevitable disaster of bankruptcy.



Fifty Years of Manufactured Abrasives

UNTIL 1891, the only abrasives were natural ones. Gem cutters used diamond dust for cutting, forming and polishing precious stones. Wheels cut from sandstone were the principal means of sharpening tools until about the middle of the 19th century, when the natural abrasives, emery and corundum, were bonded into wheels.

None of the wheels fashioned of the various natural abrasive materials were precision tools. They were irregular in composition. With emery wheels it was possible to put a shiny surface on metals which had been previously formed and cut nearly to size, but the operation was burnishing or polishing—not grinding.

The metal working industry, especially, was in great need of an abrasive substance which would be uniform in composition, sharp, nearly as hard as diamond, inexpensive, and which could be formed into wheels which would permit of accurate grinding.

The Discovery of Carborundum

Dr. Edward G. Acheson had noticed in some of his experiments in the reduction of ores, that when clay articles were heated to high temperatures in natural gas-fired furnaces, the clay became impregnated with carbon and seemed harder than ordinary "fired" clay.

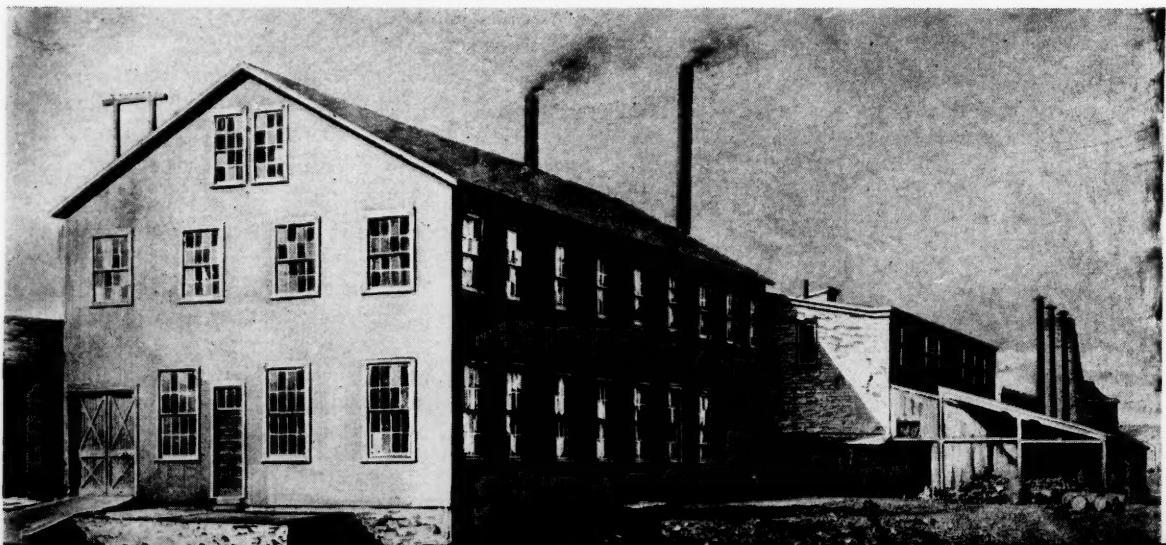
In March 1891, he determined to carry

The present plant of the Carborundum Company at Niagara Falls, N. Y., shown above is in striking contrast to the company's first plant (below) located at Monongahela City, Pa. It was in this latter building that the late Dr. Edward G. Acheson created the first man made abrasive.

on those experiments with an electric furnace—a crude affair which he made out of an ordinary plumber's pot such as is used for melting solder. To this he connected two copper wires, one attached to the crucible and one to an arc-light carbon. This electrode was surrounded by a mixture of clay and coke in the crucible.

After the heavy electric current had passed through this mixture for some time—generating a very high temperature—Dr. Acheson turned off the current and allowed the mixture to cool.

When he examined the contents of the crucible he was disappointed, for nothing important seemed to have happened. "By mere chance," as he said, he happened to notice a few minute crystals of some substance sticking to the point of the carbon electrode. Picking them up on



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a point of a lead pencil he found that they would not only cut glass but would also scratch the diamond in his ring.

He did not know what they were, but suspecting that they were a mixture of natural aluminum oxide known as "corundum" and carbon, he coined the name "Carborundum" and registered it as the trade name of the new substance. Chemical analysis showed that it was actually silicon carbide, an absolutely new material which does not occur in nature.

Growth of the Industry

Dr. Acheson built a larger furnace in his small plant at Monongahela City, Pennsylvania, and soon was able to produce larger amounts of silicon carbide. The first crystals were sold to gem polishers at \$880 a pound.

To avail himself of the cheap electric power made accessible by the development of Niagara Falls in 1895, Acheson moved his plant to that city where The Carborundum Company which he founded still operates its main works.

Realizing that his new abrasive would be of inestimable value to industry if made into wheels, he tried to get the established manufacturers of emery wheels to use it. They objected that it was impossible to make a successful wheel with the new substance.

Undaunted, Acheson began to manufacture wheels in his little Monongahela plant and the first "Carborundum" wheels to be made were the tiny mounted shapes now used largely by dentists. Later George Westinghouse ordered several thousand wheels for use in grinding joints in his new incandescent electric lamps. Acheson says in his memoirs that he made up that order with his own hands.

A few years after Acheson's invention, Charles B. Jacobs discovered a method for making aluminum oxide in the electric furnace. Aluminum oxide is the chief abrasive constituent of natural emery and corundum. It is tougher than silicon carbide, but not as hard nor as sharp. Between the two, industry now has abrasives suited to the grinding of all types of metals and many other substances.

What Modern Abrasives Mean to Society

It is not a mere accident that the greatest strides in low-cost mass production of nearly all commodities have been made in the fifty years since Acheson discovered "Carborundum." Manufactured abrasives have played an important part in that development.

In the metal working industry the connection between abrasives and mass production is fairly evident. It would be possible to mention hundreds of products, made of metal, whose low price and high quality is largely due to grinding, shaping, finishing and polishing with modern abrasives. It is natural when discussing



Acheson's second furnace, built of brick, in which the power was carried to the mixture through electrodes set in the side of the furnace.

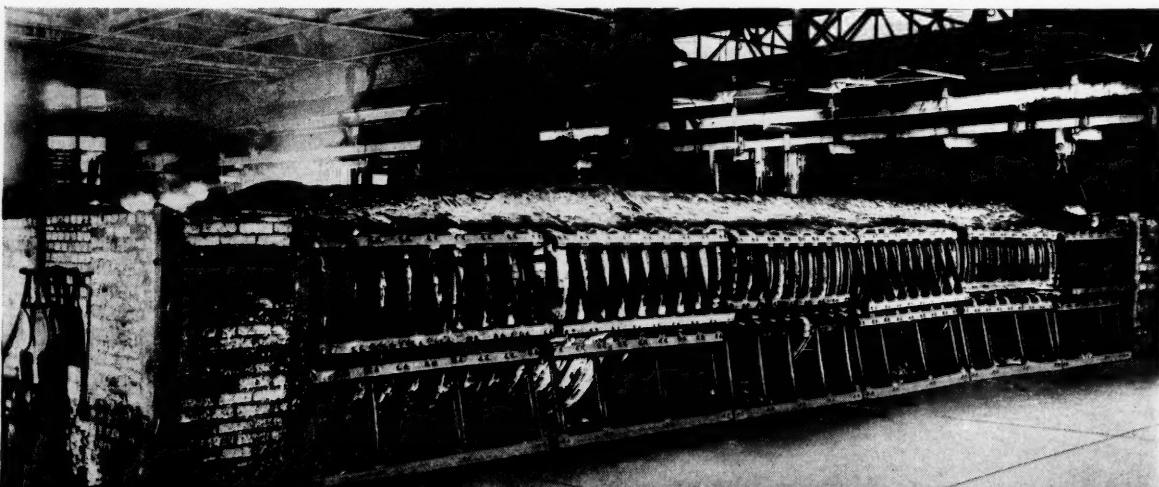


Dr. Acheson re-enacting his experiment of 50 years ago through which he created the first crystals of silicon carbide. Note the replica of Acheson's first furnace, which was simply an iron bowl such as plumbers use for the melting of solder.

this to cite the automobile. But what is true of the automobile is also true of such necessities as airplanes, typewriters, washing machines, various electric appliances such as toasters, fans, refrigerators

Since the automobile came into common use, great advances have been made in producing surfaces so smooth that to

On of the giant electric furnaces used in the modern manufacture of silicon carbide.



call them "mirror-like" is under-stating the fact. This has come from improved grinding methods and from subsequent honing and lapping with abrasives of such surfaces as the crankshaft pins and bearings and the inside of cylinders.

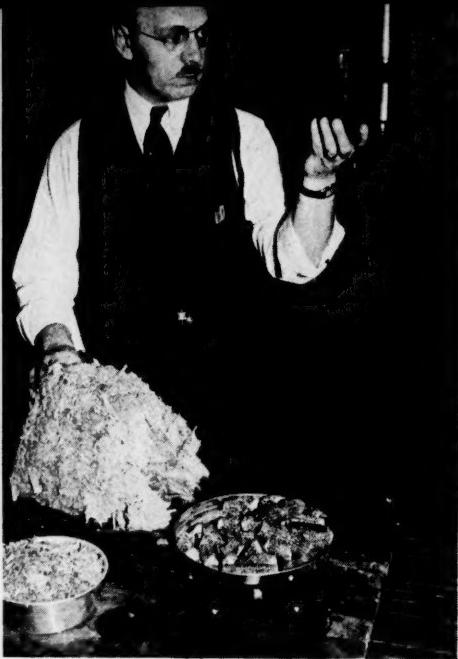
Formerly, it was necessary to run a new car at low speeds for several hundred miles while the bearings and pistons "wore in"—that is, until the surfaces wore smooth. Otherwise the comparatively rough surfaces would over-heat and serious damage result to the machine.

No wearing-in is needed on a modern car. The brand new surfaces are already smooth. So you can drive as fast as you wish from the dealer's floor.

These fine smooth surfaces of course make for less wear, and consequently reduce trouble, reconditioning and repair expense.

The same is true of airplane motors. Twenty years ago the valves had to be reground after every 20 hours of flying time. Now, partly because of their improved surfaces, valves are good for 200 flying hours.

Aside from the economy resulting from
(Continued on page 60)



THE experimental development of agricultural residues, particularly bagasse, for the production of low-cost molding compounds has received increasing attention in recent years. The United States Department of Agriculture¹ estimated the average annual production, on the dry basis, of straws, corncobs, hulls, corn stover, bagasse and other residues for the period 1931-1935 at more than 173,000,000 tons, of which more than \$4,000,000 tons was considered to be available for industrial use. These figures do not include nutshells, fruit pits, weeds and other uncultivated vegetation, or wood wastes, which have chemical and physical characteristics and properties similar to those of the materials cited above. The data for the production of the individual materials and the proximate analyses of some are given in table 1.

The industrial utilization of even a

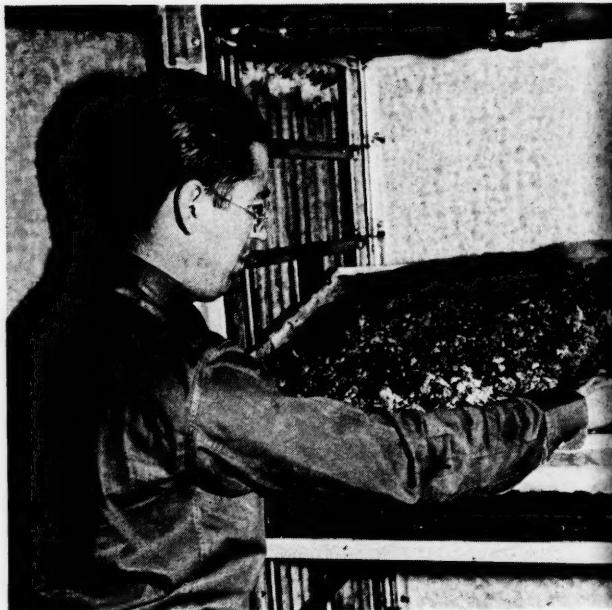
Plastics from Bagasse and other Agricultural Residues

by

S. I. ARONOVSKY and T. F. CLARK
*Agricultural Byproducts Laboratory,
Ames, Iowa*

Top left—Dr. S. I. Aronovsky, head of the Agricultural By-Products Laboratory, with some of the raw materials and finished plastic materials. Bottom left—Baled sugar cane bagasse. Right—Drying digested bagasse in a steam heated oven.

U. S. D. A. photos by Killian



relatively small portion of these agricultural residues would have far-reaching effects on the agricultural and national economy of the United States, because it would result in a larger cash income to the farmer, would increase the degree of national self-sufficiency with regard to a number of strategic raw materials, and would conserve some of our irreplaceable natural resources, such as forests, coal and petroleum.

To make the utilization of these agricultural residues attractive as raw material sources to industry it is necessary to provide their continuous adequate supply to the manufacturing plant at a relatively low cost. The mechanical and economic problems of harvesting, collection, trans-

portation, storage and preservation will have to be better solved before substantial tonnages can be moved into industrial channels. Sugar cane bagasse is in a favored position in that the cost of initial collection and defibering has already been absorbed in the manufacture of sugar. Costs of baling, storing and transportation after receipt from the sugar mill must be borne by the using industry.

A considerable amount of bagasse has been used in the production of structural and insulating board in the last twenty years. However, the total consumption for this purpose in the United States and its insular possessions probably does not exceed 250,000 tons annually. A small amount of the bagasse is used for livestock bedding, stock feed, and for other purposes. The major portion is burned for fuel at the sugar factories.

The rapid growth of the plastics indus-



*Established by the Bureau of Agricultural Chemistry and Engineering, U. S. Department of Agriculture, in cooperation with the Iowa State College.

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try and active interest in the utilization of lignin (one of the principal plant constituents) opens up the possibility of using the lignin-containing agricultural residues for the production of low-cost plastics. Numerous methods for the treatment of these residues and of other lignin-containing materials^{2, 3, 6} have been suggested. In 1933 the United States Forest Products Laboratory at Madison, Wisconsin proposed methods for producing plastic molding compounds from sawdust and from some of the agricultural residues^{8, 9}. These methods consist essentially of hydrolyzing or digesting the raw material at elevated temperatures and pressures with dilute acid or with aniline, and mixing the hydrolyzed residue with suitable plasticizers. These procedures appeared promising for application to the annual crop residues and were chosen for the preliminary studies on

Removing the plasticized molding powder from the ball mill.



Adding chemicals to bagasse in the autoclave.

moisture absorption (fairly low for a 48-hour immersion), a sclerometer hardness of 85, and a specific gravity of 1.42. Some of the physical properties of the molded material are indicated in table 2. The molded products are dense, black, opaque, lustrous and readily machined with high-speed cutting tools or carborundum wheels. Being uniform in physical structure the molded products may be ground, sanded and polished throughout their entire body.

Alkaline-Furfural Digestion

Preliminary tests at this laboratory of molding compounds prepared by digesting bagasse in an alkaline furfural solution and precipitating the dissolved lignin complex by acidification, gave indications that this method of digesting with a combination of plasticizing and pulping agents merits further consideration. Although moisture absorption of specimens molded from compositions to which no additional plasticizing agents had been added was relatively high, the flexural strength approached 7000 pounds per square inch, as indicated in table 2. Additional studies on this method are being conducted.

(Continued on Next Page)

bagasse carried out in the Agricultural Byproducts Laboratory of the U. S. Department of Agriculture at Ames, Iowa. These studies dealt with the effects of such variables as temperature, pressure, period of hydrolysis, type and amount of plasticizers, etc., and resulted in a number of modifications of the methods^{4, 5}.

Acid Digestion

A satisfactory molding composition was obtained from bagasse digested for 30 minutes with one percent sulfuric acid at a pressure of 135 pounds per square inch. After filtering, washing, drying and grinding, the powder was mixed with 8 percent each of aniline and furfural. Specimens molded at about 325° F. under a pressure of 3500 pounds per square inch had a fairly high flexural strength or modulus of rupture (approximately 7000 pounds per square inch), 2.7 percent

Filling an ash tray mold with finely ground molding powder. Finished ash trays in the foreground.

U. S. D. A. photos by Killian



Aniline-Digestion

Early tests with the aniline-digestion method gave specimens exhibiting flexural strengths as high as 9000 pounds per square inch. Extending this investigation, molding compositions were prepared from a series of 24 digestions in which the effects of the various factors outlined above were studied. The aniline-digested residues were washed, dried, ground, and mixed with plasticizing agents such as furfural alone, furfural and aniline, or furfural and phenol. Data showing the maximum, minimum and average strength characteristics and other physical properties of 60 specimens molded from powders prepared under varying conditions are given in table 2.

The flexural strength of three commercial phenol-formaldehyde molding compounds was determined for comparison with those obtained with the bagasse molding powders. These phenol-formaldehyde type plastics also exhibited flexural strengths of approximately 7000 pounds per square inch (table 2).

The experiments with aniline digestion indicated that some of the variables in the preparation of the molding powders have definite effects upon the physical properties of the molded product. A low water-bagasse ratio in the digestion charge is necessary for maximum plastic flow and maximum moisture resistance of the finished plastic, and a high ratio is desirable for maximum strength. The optimum amount of aniline for digestion is 20 to 25 percent of the weight of dry bagasse. Lower digestion pressures tend to give good strength characteristics while higher pressures improve the plastic flow and moisture resistance. While a shorter digestion period at higher pressure increases the strength of the plastic, a longer cooking time at lower pressure is more desirable. A relatively large proportion of fines in the powder apparently enhances the strength of the resulting product, provided the original fiber length is not reduced drastically. Plasticizing of the digested material before grinding

TABLE 1—Average annual production for 1931-35, inclusive, and proximate analyses of certain agricultural byproducts 4, 7

Byproduct	Average production of dry byproduct 1,000 tons	Estimated quantity of dry byproduct available for industrial use 1,000 tons	PROXIMATE ANALYSIS a				
			Cellulose %	Alpha-Cellulose %	Lignin %	Pentosans %	
Wheat straw	38,794	29,000	53	34	19	28	
Rye straw	2,378	1,800	..	..	..	..
Oat straw	20,156	..	53	44	19	23	
Barley straw	5,965	4,474	..	..	..	..
Flax straw	1,128	1,128	65	50	22	20	
Rice straw	1,089	820	..	..	..	..
Corn stover	63,681	28,500	46b	35b	18b	28b	
Corncobs	12,408	1,400	71	43	19	32	
Oat hulls	4,651	150	..	..	..	..
Rice hulls	182	182	..	..	..	..
Cottonseed hulls	1,165	583	..	..	..	..
Other hulls	183	92	..	..	..	..
Cotton stems & pods	17,544	12,281	..	..	..	..
Bagasse							
Continental United States	423c	423	60	43	19	29	
Insular United States	3,276	3,276	..	..	..	..
Total	173,023	84,109	..	..	..	..

a Percentages based on oven-dry material.

b Analysis of striped cornstalks.

c Estimated 1937-1938 production 786,000 ton (1).

tends to increase the strength of the molded product.

Based on these findings, conditions were selected which would be expected to produce a molding compound of a reasonably high degree of flow and good strength characteristics. A molding powder prepared from bagasse under the chosen conditions yielded molded specimens which gave results in line with expectations. This indicates that the molding qualities and physical properties of bagasse powders can be varied to meet definite requirements within reasonable limits.⁵

Aniline-bagasse molding powder, although considered thermosetting, exhibits some thermoplastic characteristics. When molded specimens were fused with additional powder at the usual temperature and pressure, it was found to be practically impossible to determine the line of demarcation where fusion had taken place. Molded specimens ground to a fine powder have been remolded under the original conditions of temperature and

pressure. Bagasse plastics with metal inserts have been molded successfully in this laboratory, indicating excellent adhesion of the metal to the plastic. Veneers (woods, plastics, metals, etc.) may be applied either at the time of initial molding or as a subsequent operation. Although the molding powders described above always give a lustrous black product, it is possible to incorporate suitable pigments to produce colored and mottled objects. The plastic compositions prepared from the aniline-hydrolyzed bagasse exhibited, in general, greater plastic flow, flexual strength, and resistance to moisture absorption than products prepared by the acid-hydrolysis and alkaline-furfural methods. A pilot plant for the production of molding powders from bagasse, based on procedures developed at this laboratory, has been erected at a sugar mill in Louisiana. This experimental plant has a capacity of about 200 pounds of powder per day.

These agricultural molding compounds have aroused a great deal of interest in

TABLE 2—Average of certain physical characteristics of plastics produced from sugar cane bagasse

TREATMENT OF RAW MATERIALS	Yield of Digested Material (basis oven-dry bagasse) %	Flexural Strength (Modulus of Rupture) lb./sq. in.	Izod Impact Strength (Energy Absorbed)		Moisture Absorption (basis oven-dry molded product) %	Specific Gravity	Hardness (Shore Sclerometer)	Bulk* Factor	Moisture in air-dry molded product %
			Notched ft.-lb.	Unnotched ft.-lb.					
Acid- ^a Hydrolysis	Maximum	..	6983	....	3.37	1.42	87	....	1.27
	Minimum	..	5805	....	2.29	1.42	83	....	0.38
	Average	65	6349	....	2.69	1.42	85	....	0.80
Aniline- ^b Hydrolysis	Maximum	..	6900	0.254	0.618	2.99	1.38	90	5.23
	Minimum	..	3175	0.074	0.155	0.64	1.28	71	2.50
	Average	90	4650	0.120	0.254	1.27	1.34	83	3.42
Soda-Furfural ^c Hydrolysis	Maximum	..	5982	....	4.04	1.41	81	....	1.12
	Minimum	..	5560	....	3.57	1.41	81	....	0.97
	Average	79	5771	....	3.81	1.41	81	....	1.04
Commercial Phenol-Formaldehyde									
1	..	7063	....	....	0.34	1.34	98	....	0.25
	2	..	7107	....	0.42	1.41	95	....	0.23
	3	..	6898	....	0.38	1.38	95	....	0.24

*Ratio of volume of finished powder to volume of molded product.

^aDigested material plasticized with aniline and furfural.

^bDigested material plasticized with furfural, furfural and aniline, or furfural and phenol.

^cNo plasticizers added.

the automotive and rubber industries, resulting in cooperative experimental work between this laboratory and the research organizations of some of the large automobile and rubber manufacturers. During this cooperative work it was found that the aniline-bagasse molding powders can be compounded with some synthetic rubber materials, as well as with natural rubber. This led to a number of possible applications. Automobile steering wheels molded from a mixture of aniline-bagasse powder and synthetic rubber have passed all laboratory and service tests. A gasket material prepared from a similar mixture apparently has excellent oil-resistance and, if not subjected to heat, is superior to the usual gasket type of packing due to its high recovery or resiliency. Aniline-bagasse powder may also be substituted for part of the shellac or similar products in the preparation of the hard, dense, lustrous materials used for fender guards. The automobile industry has also shown considerable interest in the use of molding powders from agricultural residues for production of buttons, knobs, dashboards, panels and other automobile parts and garnishing.

The molded plastic may find use as electrical insulation material in the manufacture of radio and other electrical equipment. Tests on specimens prepared during early studies have shown that some agricultural residue plastics have an electrical resistance, at 30 percent relative humidity, of approximately 5×10^{11} ohms per square centimeter, a value comparable with that of phenol-formaldehyde and phenol-furfural plastics.

The strength characteristics, workability and relatively high moisture resistance of products molded from agricultural residues may be of interest to the building and furniture industries. If products such as floor and ceiling moldings, tiles, table and desk tops, window frames, furniture and numerous other articles could be made at low cost and with desirable properties not attained by materials used at present, it might be possible to move substantial quantities of residues into these industrial channels. However, further research and experimental development work, on a laboratory as well as on pilot-plant scale, will be necessary to solve the many chemical and mechanical problems involved.

Conservatively estimated costs of raw materials for producing molding powders by the methods outlined are indicated in table 3. These costs will vary with the availability and quantity of the raw material required, locality of the manufacturing plant, and with other economic factors. The estimated cost of raw materials for the aniline-hydrolyzed molding composition is somewhat greater than that for the soda-furfural powder and more than twice as great as that of the raw materials used for the acid-

TABLE 3—Estimated cost of raw materials for the production of bagasse molding powders, (a) (b)

Raw Materials	Type of Bagasse Powder					
	Quantity Required lb.	Cost \$	Quantity Required lb.	Cost \$	Quantity Required lb.	Cost \$
Bagasse, oven-dry, at \$8.00/ton	2630	10.52	1900	7.60	2165	8.66
Sulfuric Acid, 66%, at \$16.50/ton	27	0.22	....	....	910	7.41
Caustic Soda, 76%, at \$2.30/ewt.	....	....	....	....	660	15.18
Aniline, at \$0.15/lb.	135	20.25	535	80.25	135	20.25
Furfural, at \$0.10/lb.	135	13.50	135	13.50	395	39.50
Zinc Stearate, at \$0.35/lb.	17	5.95	17	5.95	17	5.95
Total cost per ton of plasticized powder	....	50.44	....	107.30	....	96.95
Cost per lb. of plasticized powder	....	0.025	....	0.054	....	0.049

(a) Based on 1 ton of finished molding powder using average yields as given in table 3.

(b) These figures do not include the costs of labor, steam and power, equipment, maintenance and depreciation, taxes, overhead, etc.

hydrolyzed powder. However, the aniline-hydrolyzed powders have certain advantages over those prepared by the other two methods, as discussed previously.

An estimate of the final cost of the finished powder, on a commercial basis, would necessarily include the cost of labor, steam and power, equipment, maintenance and depreciation, taxes, overhead, etc. These items would vary with the type of powder, with the production capacity and location of the plant, and with other economic conditions. Reasonably accurate estimates of these cost items would require pilot-plant rather than laboratory studies.

Comparative investigations on various agricultural residues, including wheat, oat and rye straws, cornstalks, cobs, flax shives, tobacco stems, bagasse, and lignin residues from the production of furfural, are being conducted at this laboratory. Complete data on the physical properties of molded products from these various materials are not yet avail-

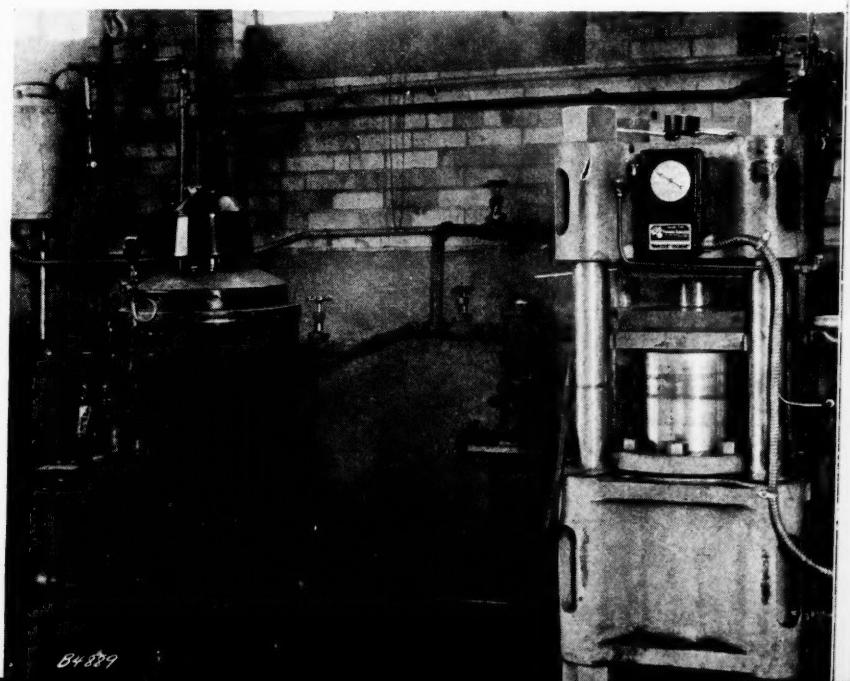
able, but preliminary observations indicate that a number of differences exist. However, the black color and outward appearance of the molded product are very much the same for all of these raw materials.

The plastics work of this laboratory will be incorporated into the greatly enlarged program of plastics research to be conducted by the Agricultural Residues Division of the Northern Regional Research Laboratory, United States Department of Agriculture, at Peoria, Illinois. This Division is also actively engaged in investigating the problems of harvesting, collection, transportation, storage and preservation of the agricultural residues—problems which have a most important bearing on their industrial utilization.

It may be seen from the foregoing studies on bagasse that it appears to be a suitable raw material for the production of low-cost molding compounds. Its ready availability in sizable quantities at the sugar mills is a factor which favors this raw material at the present time. Experimental bagasse molding powders have produced plastic materials with dielectric and other strength char-

(Continued on page 59)

High pressure steam boiler and press used for molding bagasse plastics at Agricultural By Products Laboratory, Ames, Iowa.



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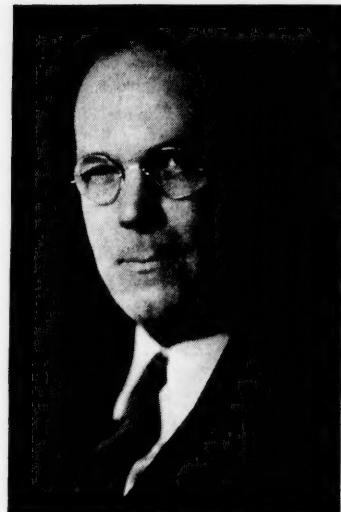
Rubber, Natural and Synthetic

Part I

BY

J. W. Schade,

*Director of Research
The B. F. Goodrich Co.*



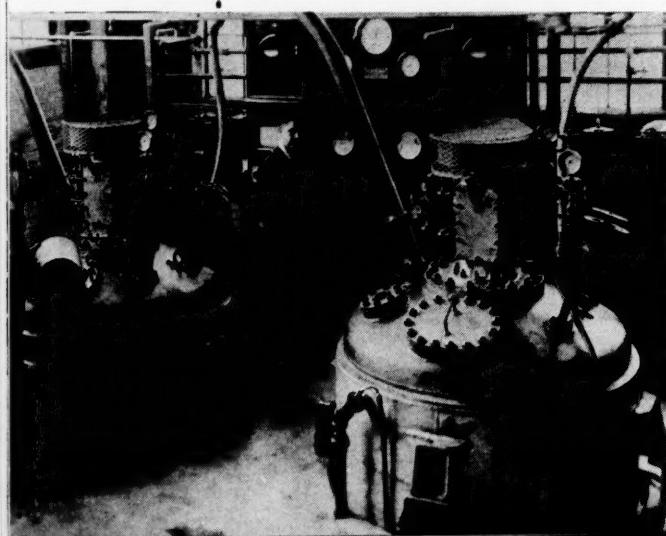
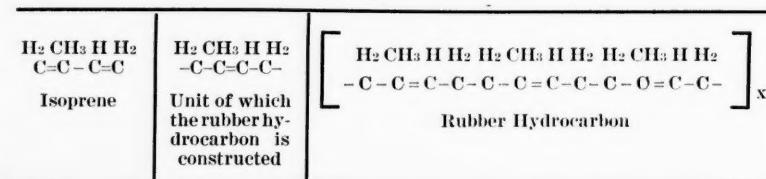
ALTHOUGH at the time preparation of this discussion was first contemplated considerable information had been published concerning the composition and properties of certain synthetic rubber-like materials, no article had appeared summarizing the work in this field and comparing the properties of the various kinds of synthetics. The Bureau of Standards, U. S. Department of Commerce, has since issued its Circular C427 entitled "Synthetic Rubbers, A Review of their Compositions, Properties and Uses" by Lawrence A. Wood. This excellent summary is worthy of study by anyone interested in the potential uses of any of these materials. Recent as this publication is, it is nevertheless already inadequate to supply data concerning synthetics which have been announced within the past few months. There is no information in the circular about Ameripol rubbers¹ (The B. F. Goodrich Co.), Butyl rubber² (Standard Oil Development Co.), nor Chemigum (The Goodyear Tire & Rubber Co.). Furthermore, new varieties of Neoprene and Thiokol have been recently developed. The relative values of these newer synthetics for commercial applications have yet to be ascertained.

What Is Rubber?

Rubber technologists are not unanimous in agreement as to what properties a synthetic material must possess to qualify as a rubber. Many synthetic substances, such as synthetic indigo or synthetic methanol, are chemically identical to those of the same name derived from vegetable origins. In contrast, all of the commercially available synthetic materials classified in this discussion as rubbers are distinctly different in composition from that of the natural product. Such valuable properties as strength, stretchiness and elasticity are not determined by the kind of chemical elements of which the rubbers are composed but rather by the arrangement of the atoms in the molecules, by the size of the mole-

cules and by the structures produced as the result of vulcanization processes. Here the classification is based solely on physical properties and all these synthetics resemble natural rubber in some of the physical characteristics on which its wide usefulness depends. The meaning of the word rubber has changed. It no longer signifies a particular hydrocarbon material but has been widely adopted to characterize a class of substances similar physically to natural rubber regardless of their chemical composition. In order to qualify as a rubber a material should stretch readily to a considerable degree and, after release, retract forcefully and quickly; but no specific criteria have been generally accepted limiting the

CHART I



In large steel vessels, such as those shown here, butadiene and other ingredients are agitated and emulsified in process which "polymerizes" them into the synthetic rubber, Ameripol, which has a molecular structure similar to that of natural rubber. The process is regulated from the control panel in the background.

values for these properties.

Varieties of Synthetic Rubber

In his circular Mr. Wood lists twenty-nine products under the heading "Varieties of Synthetic Rubber." Some of these, notably Methyl Rubber made in Germany during the World War of 1914-1918, are not now obtainable commercially. The list also includes essentially identical products under different names. The synthetics which recently have been or are now of commercial interest in this country are of five types:

1. Polymers of chloroprene—Neoprenes.
2. Reaction products of aliphatic di-

halides with alkali polysulfides—Thiokols.

3. Co-polymers of butadiene with other polymerizable compounds—Perbunan, Buna S, Ameripol, Hycars, Chemigum⁶.

4. Plasticized polymers of vinyl chloride—Koro-seal.

5. Polymers of isobutylene—Vistamex.

All Rubber Consists of Long Molecules

As has been stated, all of these differ chemically from natural rubber. It was postulated many years ago that the molecules of natural rubber are made up of a great number of C_5H_8 groups derivable from isoprene by a shift of chemical linkages. The first chart shows the structure of isoprene and of the hydrocarbon of natural rubber.

Calculations indicate that rubber contains from 200 to 4400 C_5H_8 units per

From the polymerizers comes a thick milky-white liquid containing 2½ pounds of synthetic rubber per gallon. This latex is then stirred in vats where it is stabilized to give the finished rubber resistance to heat and oxygen. Then the rubber content of the liquid latex is solidified in another vat by coagulating it with dilute acid. Here Dr. Semon is shown stretching a particle of the raw synthetic rubber.



CHART II

	BASIC MATERIALS (MONOMERS)	UNIT OF POLYMER	PRODUCTS
	$H_2 CH_3 H H_2$ $C = C - C = C$ ISOPRENE	$H_2 CH_3 H H_2$ $-C - C = C - C -$	RUBBER
1	$H_2 Cl H H_2$ $C = C - C = C$ CHLOROPRENE	$H_2 Cl H H_2$ $-C - C = C - C -$	NEOPRENE
2	CH_2Cl $CH_2Cl + Na_2S_4$ ETHYLENE DICHLORIDE SODIUM TETRA-SULPHIDE	$H_2 H_2 S S$ $-C - C - S - S -$	THIOKOL A
3	$x(H_2 H H H_2)$ $C = C - C = C$ CN BUTADIENE ACRYLO NITRILE	$(H_2 H H H_2) H_2 H$ $-C - C = C - C -$ x CN	BUNA N (3) PERBUNAN PERBUNAN EXTRA
3	$y(H_2 H H H_2)$ $C = C - C = C$ $C = C$ C_6H_5 BUTADIENE STYRENE	$(H_2 H H H_2) H_2 H$ $-C - C = C - C -$ y C_6H_5	BUNA S
4	$H_2 H$ $C = C$ Cl VINYL CHLORIDE	$H_2 H$ $-C - C -$ Cl	THE PLASTICIZED POLYMER IS KORO- SEAL
5	CH_3 $C = CH_2$ CH_3 ISO BUTYLENE	$CH_3 H_2$ $-C - C -$ CH_3	VISTAMEX

molecule varying with preliminary treatment of the hydrocarbon and the method of measuring its molecular weight. How the long chains of carbon atoms are built up by growing plants is not definitely known; but similar chains of carbon atoms or atoms of carbon interspersed with other elements can be produced by artificial means through polymerization of relatively simple molecules. Chemical polymerization may be likened to the formation of a metal chain, the individual links representing the simple molecules, the completed chain the polymer. The links may be all alike or links of different materials may be joined in the same chain. Natural rubber may be considered as a polymer of isoprene of high, though not uniform, molecular weight. It should be noted, however, that no polymer of isoprene yet made artificially has approached the quality of rubber closely enough to be suitable for practical use. Similarly the molecules of synthetic rubbers are chain polymers of great length. It has been ascertained that the size of the polymers, i.e., the length of the chains, and the degree of cross-linkage between them which occurs to some extent during polymerization determine the physical properties of the materials. These factors are controlled by regulation of temperatures and by the kind and amount of catalysts used in the polymerization process. Such attributes as resistance to swelling by solvents and electrical properties are largely dependent on the chemical composition but strength, stretchiness and elasticity are determined primarily by structure.

Chemical Structure of Rubber

For a clearer understanding of their similarities and of the differences between rubber and the five classes of synthetics the second chart has been prepared.

The co-polymers of the third group are
(Continued on page 59)

Government Regulation of Business

by

ROY W. JOHNS,

*General Counsel,
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THE most important problems involved in any consideration of the enterprise system are those problems which relate to the relationship of Government to business. The very phrase "enterprise system" suggests that relationship. The existence of any system implies order as against chaos, and in human relationships the existence of order implies a government to enforce group discipline upon individuals.

The problems of regulation and of the relationship of Government to business are as old as recorded history. As one example of many which could be quoted, it might be interesting to look over the shoulder of Emperor Zeno in 483 A.D., and read a part of an edict which he issued to the Praetorian Prefect of Constantinople, stating that "no one may presume to exercise a monopoly of any kind, of clothing, or of fish, or of anything serving for food or for any other use whatever its nature may be *** nor may any persons combine or agree in unlawful meetings that different kinds of merchandise may not be sold at a less price than they may have agreed upon among themselves. Workmen and contractors for buildings and all who practice other professions *** are entirely prohibited from agreeing together that no one may complete a work contracted for by another *** and if anyone shall presume to practice a monopoly let his property be forfeited and himself condemned to perpetual exile."

The Merchant Guilds of the Middle Ages were followed by the Statute of Monopolies passed by Parliament in 1623, after which we may trace a continuous play of the forces of liberty and regulation.

We, in this country, rapidly passed from a pioneer and colonial state to an agricultural, and lastly to a predominantly industrial state. Necessarily, increased complexity of human relation-

ships requires more rules and more enforcement if order is to be maintained and any system to exist. We often speak of the last half century as the modern industrial revolution or the machine age. On the threshold of the machine age we find the Interstate Commerce Act in 1887 which we may take as the effective beginning of government regulation of business on the grand scale, by the Federal as distinguished from State and local governments.

To take the high spots, we find the Sherman Anti-Trust Law in 1890, the Meat Inspection Act in 1906, the Federal Reserve Act in 1913, the Federal Trade Commission Act in 1914, the Clayton Act in 1914, the National Labor Relations Act in 1935, the Robinson-Patman Act in 1936, the Fair Labor Standards Act in 1938, and a host of other regulatory statutes.

Some of the regulatory acts merely prohibit certain types of conduct and leave to the Courts the problem of enforcement. Others set up administrative bodies or sub-legislative bodies having the power to exercise discretion within the framework of the law which creates them. An example of the first type is the Sherman Act which forbids contracts, combinations or conspiracies in restraint of trade or commerce and forbids monopolies of any part of the trade or commerce among the several States or with foreign nations. Examples of the other type of Act are the Federal Reserve Act which set up the Federal Reserve Banking System, the Federal Trade Commission Act which set up that Commission to investigate and discourage unfair competition, the National Labor Relations Act which set up the National Labor Relations Board to investigate industrial disputes and assure labor the right to organize, and the Fair Labor Standards Act which set up the Wage and Hour Administrator to police industry to the end that minimum

wage and hour standards be maintained.

Traditionally, Government has three important types of relationship to business which we may classify as taxation, protection and regulation, which are simply the normal relationships of Government to individuals and to groups of citizens. Our primary problem is to find that balance between these three categories of relationship which is fair to all concerned and yields the greatest social good.

Taxation has but one basic purpose, that is to furnish the funds whereby the Government may provide the protection and the regulation which society needs. Such funds as are expended for relief and essential services are considered necessary for our protection. The concepts of protection and regulation are overlapping in many cases since protection of one group may require the regulation of another. All will agree that some regulation is essential.

Human nature being what it is, all citizens must be subjected to regulation to assure that the right to the pursuit of happiness of any individual be not infringed by another who may be inconsiderate or selfish. When we consider regulations as being applicable to everybody equally and fairly we are upon safe ground, nor is there any objection to the development of classes in regulation applicable to certain types of business enterprise, since every enterprise is, theoretically at least, open equally to every citizen. When we take the next step and regulate business just because it is business, we have departed from the basic principles of democracy and fair play for a foray into an abysmal jungle of hatred, suspicion and lack of cooperation which characterizes all efforts to array one class against another.

When we admit the existence of classes and penalize any single class, we have departed from the basic common sense and purpose of regulation and entered the field of punishment for vengeance, and therein lies the chief cause for alarm in the rapid growth of regulation merely for the sake of regulation, truly a social cancer sapping the vitality of liberty at its source. The basic cause of over-regulation is simply individual selfishness.

Every group in society which is based upon selfish interest is necessarily a minority group and when it joins the majority to regulate and punish any minority group, it merely paves the way for that day when the punished minority group will itself join the majority and punish the other.

One thing which is of great importance in understanding Government and business and their relationships one to the other, is a full appreciation of the humanness of personalities. We tend to think of corporations as personalities apart

(Continued on page 62)

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Natural Gas Companies Report Gas Engine Use By Industry Doubled Since 1936

Committee Surveys

Service, Lubrication

And Heat-Recovery

Practices

IN order to gauge the growing interest on the part of industry in power development by operating internal combustion engines on natural gas fuel, the Gas Engine Power Committee of the Industrial and Commercial Section, American Gas Association, has conducted a survey of natural gas utility companies serving fuel for engine consumption, which shows (1) twice as many gas engine installations as existed four years ago, and (2) greatest development of the field among those enterprises where the smaller sizes of gas engines are adequate for their power requirements. The survey omits from consideration all gas engines operated by the gas companies themselves, and all engines which are installed on a temporary basis only.

It is significant that 104 companies responded to the survey compared with only 14 which responded to similar queries in 1936. It was found that 56 of these natural gas companies are now serving gas for engine operation, to the tune of 12,392,398,000 cubic feet consumed in 7,998 engines developing 474,629 horsepower for 4,496 concerns. On a grand average, it was found that the average engine horsepower was 59 and that 26,110 cubic feet of gas were used per year per horsepower installed.

Roughly 45 per cent of all this gas engine business was served by eight natural gas companies who reported in 1936 as well as in 1940. For these eight companies, the number of engines connected has risen 98.6 per cent, the total connected horsepower 40.8 per cent, and the annual revenue to the gas industry 89.6 per cent. The average horsepower per engine has dropped from 73 to 51.8, showing that most of the new gas engine installations have been in the smaller sizes.

This year 22 engine manufacturers reported producing models for natural gas fueling, a record number.

Utility Servicing Not a Problem— Existing Facilities Adequate

A limited inquiry among gas utility companies with respect to utility servicing and maintenance policies for gas engine accounts, revealed that "the supposed lack of servicing and maintenance facilities on the part of the utility is not a problem at all, or a comparatively minor one." Only one of the reporting companies finds it desirable to provide a complete organization actually to service and maintain gas engines. Six reporting companies find it necessary only to furnish trained men to perform minor adjustments on the engines and to educate the customers concerning proper engine servicing and maintenance.

New Hi-Speed Engines Need Careful Oil Selection

Much of the report had to do with the lubrication of gas engines. Significant among its comments on this subject were the following:

"The selection of proper lubricating oil for the modern gas engine is of the utmost importance if the wear on moving parts is to be reduced to a minimum, thus insuring long engine life and low maintenance costs. The difference in the actual cost of the lubricating oil, between the higher and lower grades of oil, is relatively small due to the low lubricating oil consumption."

"The advent of package power (high speed multi-cylinder engines as against the older large bore, long stroke, slow speed, horizontal types) brought with it difficulties. Speeds have been increased, bore and stroke reduced, and, of course, compression ratios raised considerably. Insofar as oil is concerned, the principal difficulty which arose was the increase in oil temperature due to high velocity rates of circulation and also the limited capacities of lubrication system. The problem of ring sticking has not been a serious one. The principal difficulty encountered has been to control the rate of thickening of oil."

"That this (oil thickening) may be traceable to oxidation, rather than polymerization or precipitation of unsaturates due to sulphur compounds generated in the oil, has been borne out by the fact that changing to oils which had higher inherent stability characteristics, plus the addition of some agent to enhance the stability, seems to have been the answer to some of the difficulties. The test to insure that the percentage of unsaturated compounds, in terms of sulphuric acid solubility, is less than 10 per cent, may be another method of arriving at the same conclusion. For the present, however, it is necessary to analyze each operating condition with extreme care before making any recommendations as to the proper type of oil."

"It is believed that for the high speed multi-cylinder engine SAE 30 or SAE 40 oil should be used, depending somewhat upon the operating temperature of the engine. The viscosity of the SAE 30 oil is between 51 and 68 Saybolt Universal seconds, and the SAE 40 oil is between 57 and 74 Saybolt Universal seconds, at 210 degrees F. It is also believed that an oil should not be used after the viscosity has reached 100 Saybolt Universal seconds. For the heavy duty, slow speed engine, it is advisable to conform to the recommendations of the engine builder as to the type of oil, as they are based upon a number of years of operating experience."

Answers to inquiries concerning top-cylinder lubrication were neither sufficiently numerous nor positive to permit of definite conclusions. Four companies reported that the use of top-cylinder oilers is not a determining factor in the satisfactory operating results of an engine. Two companies stated that their experience has been that engines so equipped show better operating results.

"High-Temperature-Cooling" Proved in— Offers Amazing Heat-Recovery Advantages

Continuing its investigations of "high-temperature-cooling of gas engines" because of the "great possibilities along the line of waste heat recovery coincidental

(Continued on page 66)

\$16,000,000 Steel Mill for Texas

THE first important steel plant in the Southwest will shortly be started when a steel mill involving approximately \$16,000,000 is put under construction at Houston, Texas. Announcement of the new plant was made recently by William S. Knudsen of the National Defense Commission and confirmed by Charles R. Hook, president of the American Rolling Mill Company which will build the plant.

The Reconstruction Finance Corporation authorized a \$12,000,000 loan to cover cost of the ground, buildings and equipment. The American Rolling Mill Company will own all of the stock of a new corporation to be formed for which they will pay \$3,000,000 and if additional working capital is required later on, this will be furnished by them. It is estimated that engineering, surveys and management expense contributed by Sheffield Steel Corporation of Kansas City, Missouri, which will erect the plant and by Armcō together amounts to something over \$1,000,000.

The plant will be built on a 600-acre tract located on the Houston Ship Channel immediately across from Irish Bend Island where the Todd Shipyards are to be erected at an estimated cost of \$5,000,000. The site is reported to have brought the owners \$338,000 and the fact that it has a frontage of one mile on the channel, ten miles from the center of Houston, will permit shipment of products in ocean going vessels from the company's own docks.

Pointing out that the plant is designed as a permanent industry and not merely for defense program work alone, Mr. Hook states, "the selection of the Houston location is in line with the decentralization policy of the heavy industries which has been in the minds of the administration in order that plants manufacturing defense products would be less vulnerable in case of attack. By locating increased facilities away from the highly industrialized centers, two things are accomplished. First, strategic location from a defense standpoint; and second, the creation of new jobs in areas not highly developed industrially, which will continue to materially benefit economic conditions in such areas after the present emergency is over. In the case of this

Texas plant, raw materials of the area will be used to make the finished products which will be consumed in the area in the after-emergency period."

"The capacity of the plant will be modest with respect to the total production of the products consumed in the area to be served by these new facilities. This policy will prevent a disturbance of the normal distribution and competitive conditions in the area after the emergency is over."

The plant itself will consist of an open hearth department containing three 100-ton open hearth furnaces with a capacity of approximately 200,000 net tons of ingots per year; a billet and structural mill with a capacity exceeding 145,000 tons of billets and slabs, structurals, tie plate bar and 2 x 2 billets per annum; a rod mill with a capacity approximating 46,000 tons of wire rods and bars each year; and a merchant mill capable of producing 30,000 tons of bars and small shapes. In addition, there will be an 84 inch plate mill from which is expected 27,000 tons per year of light plates and heavy sheets suitable for shipbuilding. A wire mill with a capacity of approximately 24,000 tons of wire products will complete the present plant.

At the outset, there will be 1,500 employees but this is expected to be increased later.

Scrap iron, on which the plant will operate principally, for shell forgings and billets, is at present entering Houston to the amount of about 300,000 tons annually and the new demand will probably increase this quantity to around 500,000 tons.

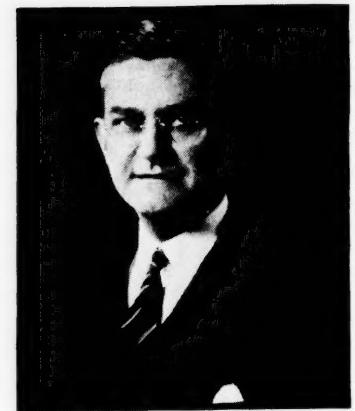
Although a Texas corporation will be organized as a wholly owned Armcō subsidiary to build the plant, operations will be managed by the Sheffield Steel Corporation, another Armcō subsidiary which operates plants in Kansas City and St. Louis, Missouri and Tulsa and Sand Springs, Oklahoma.

Officers of the Texas corporation will include Charles R. Hook, Chairman; R. L. Gray, president of the Sheffield Steel Corporation as president and Calvin Verity, vice president and general manager of Armcō, will be vice chairman.

It is believed that the production of

steel in the Houston area has added significance because it is anticipated that it will bring about the establishment of other new plants using steel products as their raw materials to manufacture such items as nuts, bolts, hardware, steel furniture, etc.

Charles R. Hook, president of American Rolling Mill Company and chairman of the company's new Texas corporation.



Contracts for Two Complete Batteries of Coke Ovens Goes to Koppers

Contracts for the construction of two complete batteries of coke ovens, with by-product recovery equipment have recently been awarded to the Koppers Company. The two awards have a combined value of more than \$10,000,000. The ovens are to be built for the Monessen Coke and Chemical Company and for the Weirton Steel Company.

The contract for the Monessen Coke and Chemical Company, a subsidiary of the Pittsburgh Steel Company, is for 74 Koppers Becker underjet ovens to be built at Monessen, Pa. These ovens will have a total coal carbonizing capacity of approximately 700,000 tons a year.

In addition to the ovens and the coal and coke handling equipment, the contract covers the construction of a new plant for the recovery of tar, benzol, toluol, phenol, and sulphate of ammonia.

The contract for the Weirton Steel Company, a subsidiary of the National Steel Corporation, covers the construction at Weirton, W. Va., of an additional battery of 45 coke ovens, of the same type as the ovens to be erected at Monessen. These additional ovens will increase the coal carbonizing capacity of the coke plant at Weirton by approximately 400,000 tons a year. They now have 111 Koppers ovens at this plant.

Bethlehem Expands Rod Mill at Maryland Plant

WITH the installation of a second group of finishing stands, and additional coiling, conveying, and storage facilities, the continuous high-speed rod mill at the Maryland plant of Bethlehem Steel Company is now equipped for rolling four strands of rod at one time. The extension roughly doubles the rod making capacity of the mill, increasing it from 500 to approximately 1,000 tons of No. 5 rod per 24 hours.

The mill was built nearly three years ago and though at the outset it rolled only two strands of rods, it was designed for ultimate four-strand operation. A second rod finishing mill has been installed. Only minor alterations in the remainder of the equipment were required to complete the change-over. The gas-fired billet heating furnace was originally built for a rated hourly output of 50 gross tons which is sufficient for four-strand production. As an extra precaution a few oil burners have been installed to insure the proper heating of the increased tonnage.

At the discharge end of the heating furnace is a four strand mechanical switch plate, actuated by cylinders, which enters the heated billet selectively into the active passes of the first roughing stand. It is capable of maintaining operation without any intervals of inactivity in any of the passes.

When just built, the mill consisted of a group of nine roughing stands, four intermediate roughers, two looping stands with repeaters, and a group of six finishing stands. To this has now been added another six-stand finishing train, substantially a duplicate of the first, except opposite in hand.

Four-strand repeaters are used between the intermediate roughers and the first looping stand, and between the two looping stands. As two of the four strands leave the last looping stand they pass through a two-strand repeater of the forward running type to one of the finishing mills. To take care of the added finishing mill a new two-strand repeater has been super-imposed on the first. The upper repeater has perforations in it to make the loops on the lower repeater plainly visible.

Rods from the new finishing train are delivered by water-cooled connecting pipes to four new automatic laying reels, capable of producing coils of 46 in. outside diameter and 34 in. inside diameter.

Two reels of the pouring type have also been installed, for coiling the heavier sizes, from $\frac{3}{8}$ " to 1" in diameter, of rod and merchant bar which are not rolled in the finishing stands. The pouring reels produce coils of 46" outside and 36" inside diameters, in weights up to 900 pounds.

The additional reels recently installed discharge upon a new conveying system which parallels the one serving the old finishing stands. This consists of an open, chain-type coil conveyor, 320 ft. long, and a 960 ft. hook carrier.

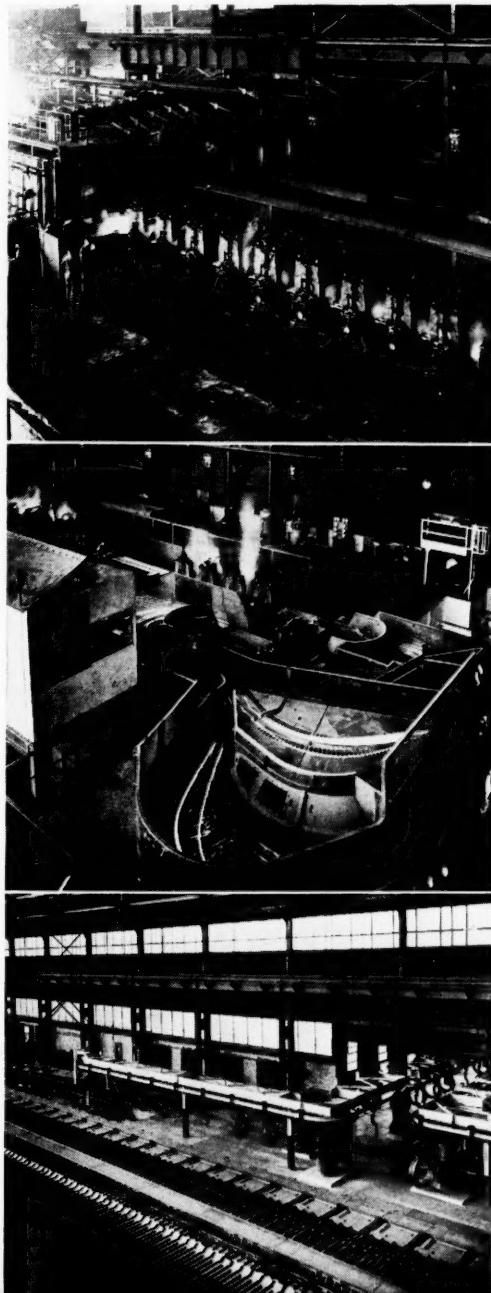
A new station, 43 x 200 ft., to unload the hook carrier has been built adjacent to the coil storage. Here bundles from both hook carriers are discharged onto a shuttle conveyor which transfers the coils to a point directly under an overhead tramrail system where these bundles are picked up by hairpin hooks and carried to the loading platform or to storage bins. To take care of the increased output a four-bay extension of the coil storage building, 75 x 100 ft. with overhead tracks and carriers, has been made, increasing the capacity by about 2,000 tons.

There are twenty-one active passes in operation when No. 5 gauge rod is rolled, from 2 in., $2\frac{1}{4}$ in., or $2\frac{1}{2}$ in. billets, 30 ft. long. The eight laying reels, in batteries of four each, receive sizes up to $\frac{3}{4}$ in. in diameter and alternately coil the four bars.

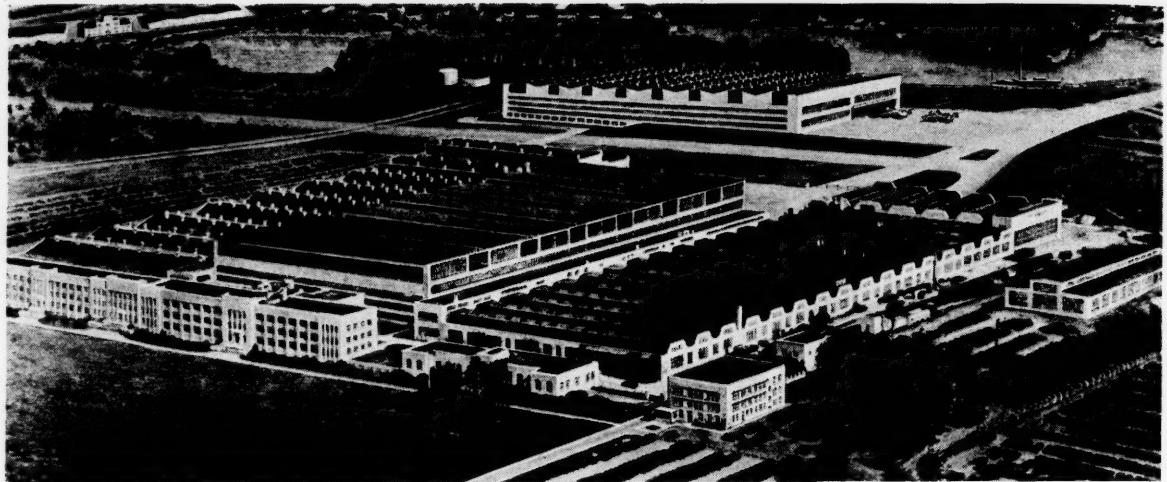
Bars $\frac{3}{4}$ in. and larger are rolled on a two-strand schedule, and are delivered from the fifteenth stand to four pouring reels, arranged in groups of two each. Bars rolled double strand may also be delivered in straight lengths to a 300 ft. double cooling bed. Bars over $\frac{3}{4}$ in. and up to $1\frac{1}{2}$ in. are rolled singly from 3 in. square billets for straight delivery to the cooling bed, whereas bars $\frac{3}{4}$ in. and smaller are rolled double strand, each strand being delivered to one side of the bed.

The space occupied by the new finish-

ing mill formerly served as roll storage space. A new building, 75 x 145 ft., has been built adjacent to the mill, to provide room for roll set-ups and spare bearings. This building is equipped with an overhead crane and a motor driven transfer car. A 100 x 225 ft. extension to the yard has increased the billet storage capacity by approximately 8,000 tons.



Number two rod mill at Bethlehem's Sparrows Point, Maryland plant. Top—Roughing stands, four strand operation. Center—Intermediate roughing stands and repeaters. Bottom—The cooling bed and hook carriers.



Martin Expansion to Raise Bomber Output Five Times

THIRTY-SIX million dollars of bombing planes a month by June 1, 1942—that, recently announced Glenn L. Martin, head of the aircraft concern bearing his name, will be the output of new and expanded facilities at Middle River, near Baltimore, in addition to the \$11,000,000 production of a modern plant to be erected at Omaha, Nebr., under a vast construction program now under way. Value of the January Martin bomber output was \$6,200,000.

Predicting a "long struggle" in the current European war with the airplane industry among the first to return to normalcy at the end of hostilities, Mr. Martin stated that his company would enter commercial plane production "head over heels" as soon as the present emergency was seen to be tapering off. Civil aviation, he observed, would derive the benefit from the wartime advances in aircraft design.

Net Martin sales for 1940 totaled \$30,663,337, the consolidated net profit after charges being \$4,306,489, or equal to \$3.92 per share on outstanding stock. Upon completion, the Baltimore plant will be capable of an annual production of \$400,000,000, with \$100,000,000 as the value

placed on the output of the Omaha plant. The company's backlog totals \$350,000,000. Order letters and letters of intention raise this to \$482,000,000.

Approximately \$24,000,000, he said, is being spent for enlarging the already tremendous Martin factory on the outskirts of Maryland's metropolis. Part of this amount is going for a second but separate factory just a mile and a quarter from existing operations now being expanded to fill the urgent need for deep-bellied Navy patrol bombers, waspish military machines for the beleaguered British and the new B-26 bomber for the United States Army.

Plant Number 2, as the separate Middle River factory has been named, as well as the Omaha plant which in general will be its duplicate, will turn out the bullet-shaped B-26 bombers with their speed said to equal the fastest pursuit planes being used in the conflict across the seas.

Top of Page—Glenn L. Martin plant at Middle River, near Baltimore, as it will appear when current \$24,000,000 expansion program is finished. Plant Number 2, not included in this composite illustration, is pictured on the next page (as it will be when completed, top; under construction, bottom).

Left—The B-26, swift bullet-like bomber, latest of Martin developments. It will be produced in both Plant Number 2 and the new Omaha unit.

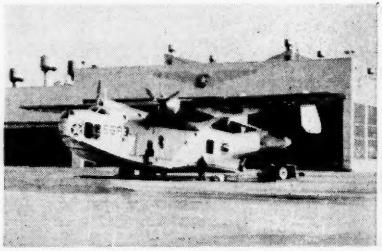
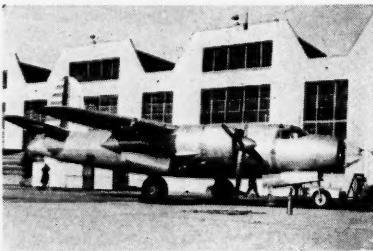
Right—Martin patrol bomber built for the United States Navy. These will be turned out in the detached building in the background of the group illustrated above.

Capacity of the Omaha plant, where site preparations are progressing, is understood to be 100 planes monthly. Numerical output of the new Middle River facilities was not revealed.

Floor space of the three plants will total nearly 5,200,000 square feet. The second plant at Middle River, according to announced figures, will represent 1,181,109 square feet of the total. The "AA", or B-26 bomber assembly floor of the second Middle River factory is to contain 1,125,189 square feet. Boiler and oil houses, drop hammer building and quarters for personnel account for the balance. These "AA" buildings will all be finished by August 15, with production rolling by November 1.

Preparations are being made to erect a group of buildings on the 500-acre Martin factory airport. The airport control building would do credit to any municipal airport and rivals in design a similar structure being built at the Baltimore city airport. Five large hangars are included in the layout. Four paved runways now 3,000 feet long are to be extended an additional 1,400 feet.

Work on the Middle River program



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started last September. Progress since that time is reputedly far ahead of other major aircraft expansions. Finished and partly tooled is a large continuation adding 153,000 square feet to the 469,000 square feet already in use for British and American bomber production. A similarly sized extension of the Navy assembly building will bring its total floor space to around 335,500.

The existing sea-bomber assembly building is understood to be the largest of its kind in the country. From it this summer will emerge the world's largest flying boats for test flights. Spacious as it is, this building is but half the area of the new 794,000-square foot Navy building now rising from the ground. Headroom clearance of both structures is 40 feet.

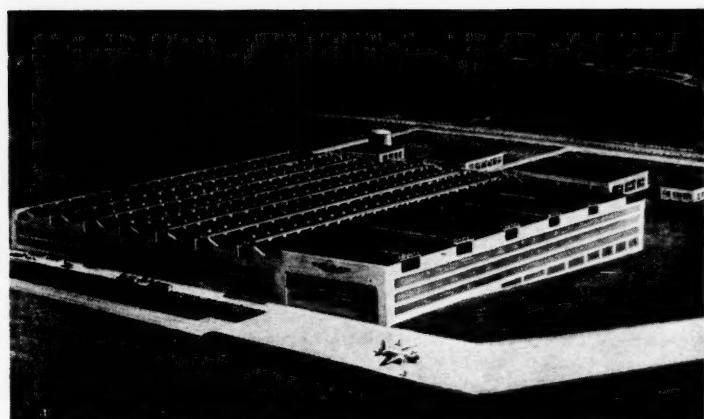
A new three-story office building at the main gate will house the rapidly expanding Martin personnel department, which by July will be called upon to handle the increase of the present 17,000 employees to a force of about 42,000. The present engineering building is to be enlarged. Upon completion of a 101,500-square foot addition, growing technical functions such as chemical, physical, metallurgical, electrical, instrument, hydraulic and photographic laboratories, will have twice the present space.

No machine bottlenecks will be encountered in the Martin program. Through the foresight of Martin officials, more than \$4,500,000 worth of tools were purchased last summer and is stored in warehouses at different points awaiting installation in the great new buildings. Pointing to time as the critical factor in the "all-out defense effort," Mr. Martin expressed gratification in being able to utilize full production capacity by the 1942 date.

To cope with the problem of housing such a large number of employees, the Martin Company is now erecting 400 low cost houses, one of which to rent for \$27 a month is now ready for inspection. Six hundred additional homes will follow this group, the Government being expected to augment this number by erection of 2,000 more. Meanwhile Federal authorities will send 600 trailers to the scene for temporary shelter.

Statistics of the square foot space oc-

Glenn L. Martin plant No. 2 as it will appear when completed at Middle River, near Baltimore. Floor space of this plant will be 1,181,109 square feet and of this, 1,125,189 square feet will comprise the assembly space for the new B-26 medium bomber.



cupied by expanded Martin operations show the total to be 5,192,725, which reduced to acres is 119.22, an area equal to most of the downtown business section of Baltimore. Distribution of the square footage is:

Plant Number	Square Feet	Acres
1 (Middle River)	2,333,079	53.569
2 (Middle River)	1,181,109	27.115
Omaha Plant	1,255,326	28.843
Airport Buildings		
(Middle River)	199,631	4.583
Leased Properties	223,580	5.132

Further delving into the statistics of an industrial expansion of the magnitude of the Martin program, which incidentally is under supervision of Paul E. Tignor, building and construction engineer, reveals the great quantities of the various kinds of construction materials needed.

These mental excavations show that for three bulk materials alone—cement, sand and gravel—the total mounts to 2,754 carloads, 333 of which are cement: 1,018, sand, and 1,403, gravel. These represent requirements for the Middle River work only. Adding the 159 carloads of cement, 540 carloads of sand and 750 carloads of gravel, which theoretically could be assumed as the approximate quantities required for the Omaha construction in view of its similarity in size to Middle River Plant Number 2, the total would

be raised to 4,203 carloads delivered over the four spur tracks into the Martin plants of Maryland and into the Nebraska project.

Figures for the B and C buildings, the one being the enlarged Navy bay and the other the practically completed Army extension, and for the entirely new Navy building and Plant Number 2, show the following quantities of various materials, other than those already listed:

ELECTRICAL WORK

Conduit—558,100 lineal feet
Cable—2,146,000 lineal feet
Fixtures—14,911
Transformer capacity (1,300 volt)—
18,730 k-v.a.

SPRINKLERS

Steel Pipe (1 to 8 in)—303,030 lineal feet
Cast Iron Pipe (4 to 14 inch)—12,808
C. R. L. Hose (2½)—4,850 lineal feet
C. R. L. Hose (1½)—9,135 lineal feet
Sprinkler Heads—24,067

PLUMBING

Sanitary Fixtures—1,575
Plumbing Fittings—70,741
Pipe—194,020 lineal feet
Pipe Covering—48,700 lineal feet
Copper Tubing—23,500 lineal feet
Caulking—59,900 pounds
Glass—410,400 square feet
Steel Deck—1,076,000 square feet

MASONRY

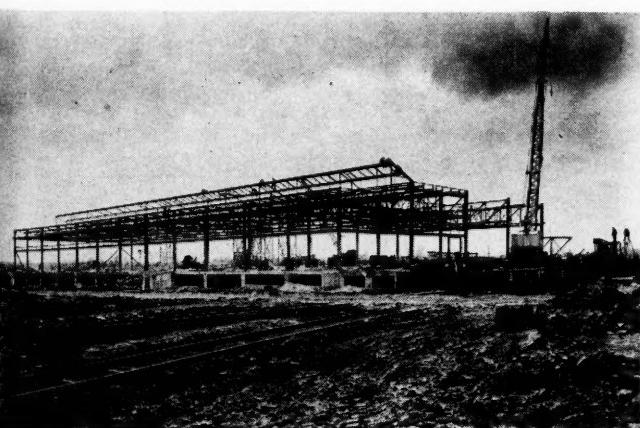
Concrete—70,456 cubic yards
Forms—1,453,000 square feet
Brick—1,610,000
Cinder Block—1,161,000 square feet
Ceramic Tile—97,700 square feet
Gunite—106,700 square feet
Limestone—4,440 cubic feet
Reinforcing Steel—4,575 tons

STRUCTURAL STEEL—9,800 tons

Fibreboard Insulation—1,076,000 square feet
Protective Metal—42,625 square feet
Pitch—898 tons
Asphalt—166 tons
Slag—1,882 tons
Copper—70,339 pounds
Roof Drains—228
Ventilators—658

EXCAVATION—383,564 cubic yards

WOOD BLOCK FLOORING—1,910,000 square feet



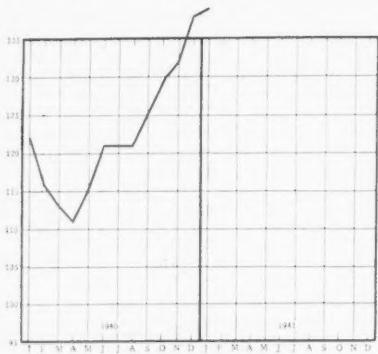
Actual photo recently taken showing steel construction work in progress on the new No. 2 plant. According to present schedules the buildings will be completed by August 15, with production to start 45 days later.

INDUSTRIAL PRODUCTION TRENDS

INDUSTRIAL production for January reached the highest point in several years, being 139 on the basis of 1935-1939 = 100 index. This is one point higher than December and 17 points higher than January 1940. As indicated in the Febru-

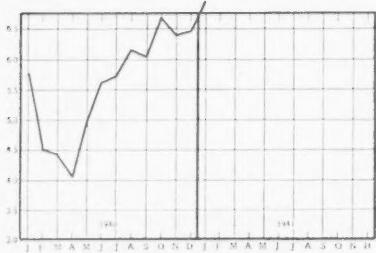
January 1940, and an average for the year of 1940 amounting to 82.1%. With completion of present expansion programs, steel production is likely to reach a much higher point than the January figure before the summer is far advanced.

Cotton consumption continued to soar, reaching the peak figure of 843,274 bales during the month of January as compared with 775,472 bales in December and 731,793 bales in January 1940. Mills continued to operate at an unusually high daily rate during February, and cotton prices also continued to advance; on the



INDUSTRIAL PRODUCTION
(Index 1935-39=100)

ary MANUFACTURERS RECORD, the yearly average for 1940, with complete returns now in, shows that the anticipated figure of 122 was exact and the continued upturn in industrial production is continuing as expected.



STEEL INGOT PRODUCTION
(Millions of short tons)

Steel production in January reached the highest point in many years with 6,943,084 tons. This was at the rate of 97.1% of capacity, compared with 83.4% in

ELECTRIC POWER PRODUCTION (Billions kilowatt hours)

other hand, the spot cotton market activity decreased seasonally but reported sales were well above those in the corresponding period a year ago.

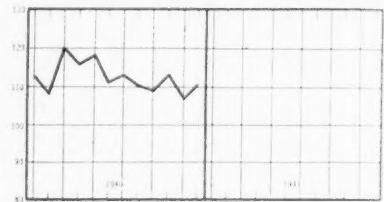
As might be expected from the continued up-surge of industrial production, electric power production continued its upward course which, except for comparatively minor recessions, has continued since the early part of 1939. January production totaled 13,299,863,000 kw. hrs. which is in sharp contrast to the January 1940 figures of 12,252,000,000 kw.



CARLOADINGS
(Millions)

hrs. The increase from the December total of 13,172,889,000 kw. hrs. was not much more than seasonal.

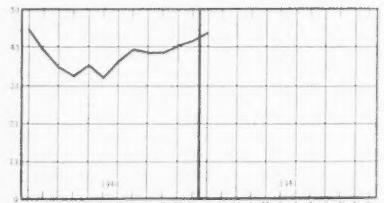
Carloadings, which dropped to 2,178,000 in December from the year's highest figure of 3,780,000 in November, again climbed upward in January to 2,737,000, which is not only higher than the January 1940 figure of 2,555,000 but also noteworthy in the fact that usually there is a



CRUDE PETROLEUM PRODUCTION
(Millions of barrels)

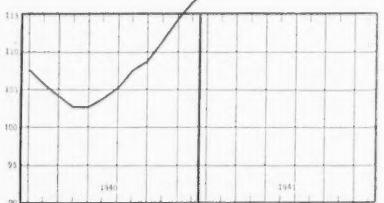
decline from December to January. Preliminary figures for February would indicate that the January upturn will be continued and probably reach close to 2,800,000 cars.

With release of crude petroleum production figures for December our predic-



BITUMINOUS COAL PRODUCTION
(Millions of tons)

tion that the year's total would show an increase of 88 million barrels or almost 7% above the 1939 total, made in the February issue, missed the actual figure by only one million barrels since the total was approximately 87 million barrels. Total production for December was 110,520,000 barrels, compared with 106,904,000 barrels in November and 115,



FACTORY EMPLOYMENT
(Adjusted index, 1923-25=100)

120,000 barrels in December 1939. The total for 1940 is 1,351,847,000 barrels.

Production of bituminous coal in January, though slightly below the January 1940 figure, totaled 43,905,000 tons or 2,505,000 tons more than the December figure. Preliminary figures for February would seem to indicate that the decline in that short month was comparatively small and that the total will closely ap-

proximate 40 million tons.

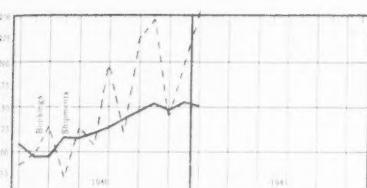
Contrary to previous years, factory employment in January, on the basis of 1923-1925 = 100 index adjusted to seasonal variation, rose 1.4 to a total of 118, the highest point yet reached. On the basis of actual figures however, there was a decline of 74,000 in factory employment during January from the December

highest in any January on record. Fabricated structural steel orders, amounting to 258,499 tons booked in January, represented an increase of approximately 130% above the average monthly orders booked by the industry during the past ten years. The total was also 55,375 tons above the December figure and 110,320 tons above the average for 1940. Shipments during January totaled 150,275 tons which was nearly 25 thousand tons above the average for 1940 and approximately equal to the total shipments of the entire industry in 1931.

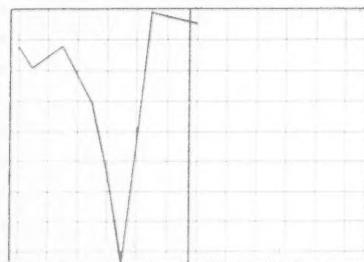
Exports, on the basis of a 1923-25 = 100 adjusted index, reached 84 in January. Imports which reached the year's highest point of 79 in December, dropped down to 70 again in January.

93.5, the highest average in many years. U. S. Treasury bonds climaxed more than half a year's constant increase to reach their highest average price in December with 111.8 dollars per 100-dollar bond and, though there was a decline to 110.4 dollars in January, it is not anticipated that the general average will fall much lower.

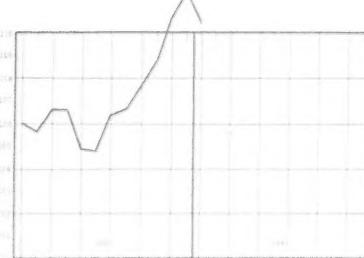
Commercial failures, which dropped to the second lowest point of 1,024 in November, rose to 1,086 in December. In spite



STRUCTURAL STEEL
(Thousands of tons)



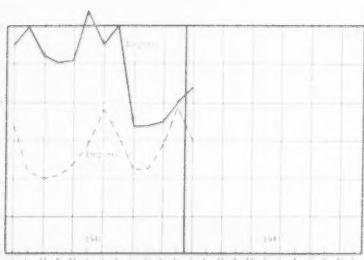
AUTOMOBILE FACTORY SALES
(Thousands)



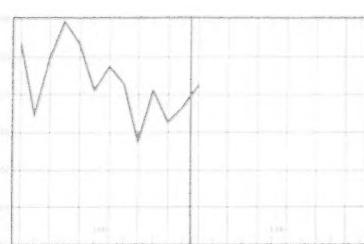
U. S. TREASURY BONDS
(Average price per \$100 bond)

of this increase however, the average monthly total was materially smaller than in 1939. The January 1941 figure is 1,124.

Chemical production, generally, increased steadily during January in line with ethyl alcohol which rose from 23,-

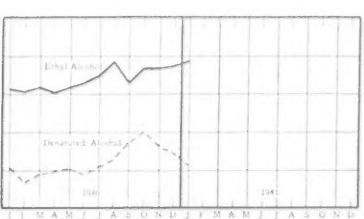


IMPORTS AND EXPORTS
(Adjusted index 1923-25=100)



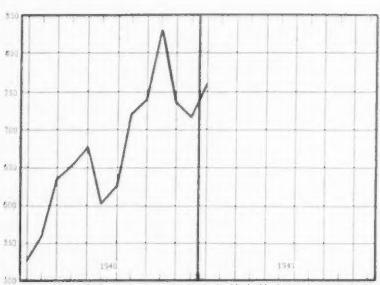
COMMERCIAL FAILURES
(Total number)

762,000 gallons in December to 24,224,000 gallons in January. Denatured alcohol suffered a decline as in December, but the 10,610,000 gallon January production is likely to be about the lowest point this will reach for the present.



ALCOHOL PRODUCTION
(Millions of gallons)

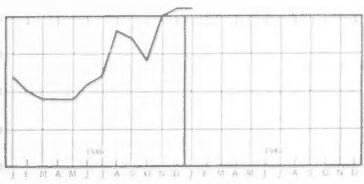
figure. This amounts to a decline of 0.9%, whereas usually there is a seasonal recession expected to exceed 2%, for such recessions have occurred in 17 of the past 21 years. Altogether, in January there were 36,343,000 workers employed in non-agricultural industries, which is the



SOUTHERN PINE PRODUCTION
(Million board feet)

Revised figures as to Southern pine production in December show that the previously anticipated decline was much greater than actually occurred. The preliminary figures for January, amounting to more than 750 million board feet, more than offset the loss made in December and closely approximates the average increase sustained throughout 1940.

With all returns now in, the 1940 factory sales of automobiles amounted to 4,469,354 or more than 892,000 greater



DEPARTMENT STORE SALES
(Adjusted index 1923-25=100)

than in 1939. The January figure of 479,481 compares with 483,567 in December and 432,279 in January 1940. The continued high rate of consumer purchasing is reflected in the 1923-25 = 100 index adjusted to seasonal variation which shows that the high point of 101 was sustained throughout January. Final figures for 1940 show that the yearly average was

What of Ramie? A Reader Asks

At the present time Ramie seems to be undergoing a resurrection and, from the number as well as the high reputation of those interested, it would seem as though this fibre is perhaps at long last due for a measure of industrial success though there can be no doubt that there are still many difficulties to be overcome.

Answering specific inquiries, it may be said that Ramie, in some one or another of its several varieties, has been grown on a commercial scale in China, India, Japan and Sumatra. On an experimental basis, it has been grown in quite a number of other countries—in Asia, Central and South America, as well as in Australia, France and the United States. In this country it is believed such cultivation of the plant as has been made has been entirely confined to those areas bordering the Gulf of Mexico.

At the present time several projects are underway, looking to the commercial utilization of Ramie as a fibre for textiles as well as for pulping purposes in the manufacture of paper. The states involved are Florida, Louisiana and Mississippi.

Ramie is a perennial plant which grows to a height of three to six feet and sends up numerous straight stalks one-half inch or less in diameter. There are three methods of growing the plant: either from seeds, stalk cuttings, or root sections. The two former methods have not been found very practicable so that most Ramie growing in this country is based upon the root sections. It is rather difficult to say how many crops per year one can get from this plant as it varies very considerably with the geographical location, soil and other factors but, as a general rule, maturity occurs anywhere

from 30 to 75 days after planting. In Louisiana the best results were obtained at the end of about two months. Up to that time the amount of fibre in the whole plants as well as in the ribbons increased perceptably with the progress of time. The same is true of the breaking strength of individual fibers.

Actually, there is little or no difficulty in the production of Ramie insofar as the agricultural point of view is concerned. The big difficulty always has been, and still remains to a large degree, the economic factors in the processing of Ramie for industrial use. Of course even in the harvesting there is much expense because usually it has to be done by hand. After the plants have been harvested it is necessary to separate the pure fiber from the remainder of the plants. This involves (1) stripping and decortication, i.e., separating the fiber bark and other impurities from the remainder of the plant; (2) degumming, or removal of the bark and gums from the fiber; (3) bleaching; and (4) softening. Therein lie the principal difficulties to the commercial utilization of Ramie. To accomplish these various steps all kinds of different methods have been propounded and experimented with, from mechanical implements to chemical separation. No one method has yet been publicly acknowledged. As a consequence thereof, machinery for these purposes is not available from any manufacturer but has to be built specially to meet individual needs. The residue of the plant has not been utilized up to the present time, in all probability because there has not been sufficient residue at any one time to permit or warrant experimentation with a view to its utilization.

\$50,800,000 for Plant Construction by du Pont in 1940

In 1940, \$50,800,000 was expended by the E. J. du Pont de Nemours Company for plant construction, of which 75 per cent provided additional capacities, and 25 per cent was for renewal and betterment of equipment and facilities. These expenditures do not include the construction costs of military plants being built for the United States and British Governments.

Expenditures for additional capacities in 1940 were principally for the manufacture of nylon yarn at Seaford, Del., and Martinsville, Va.; nylon intermediates, ethylene glycol and ammonia at Belle, W. Va.; neoprene (synthetic rubber) at Deepwater Point, N. J.; "Cellophane" cellulose film at Clinton, Iowa; acetate rayon yarn and staple at Waynes-

boro, Va.; viscose rayon staple at Buffalo, N. Y.; viscose rayon yarn for automotive tires at Richmond, Va.; and titanium pigments at Edge Moor, Del. It is expected that the total expenditures for construction in 1941, exclusive of government work, will be somewhat less than in 1940.

The estimated cost of construction work scheduled for 1941, both company and governmental, amounts to \$213,000,000. The total number of the Engineering Department's employees at the end of the year, including field forces and those employed in the Wilmington office, was 23,100, compared with 4,600 at the end of 1939; of the number at the end of 1940, about 16,300, or 71 per cent, were engaged in construction of plants for the United States and British Governments.

Radio to Give Defense Production Program

"Defense for America" is the theme of a new weekly radio report to the nation on the progress of national defense production, a program to be presented by the National Broadcasting Company, in cooperation with the National Association of Manufacturers over NBC's nationwide Red Network every Saturday night, 7:00 to 7:30 P.M., E.S.T.

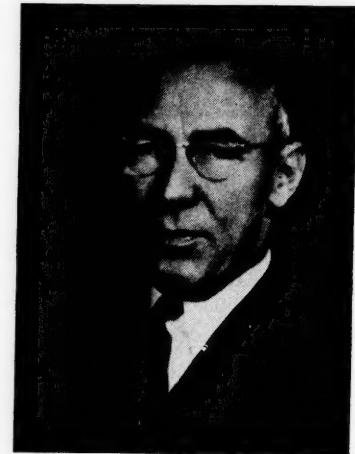
As now scheduled, the series includes 13 broadcasts to originate in as many of the country's key defense production centers. Unique in many features, the programs will undertake to dramatize not only the "personality" of each city visited but also, and more important, the role being played by the basic defense production industry characteristic of each city.

The programs will take the radio audience into defense producing plants to talk with employees at their benches, and into the offices of production executives to hear how American industry is making America strong.

New General Manager of Sales for Roebling

Ernest C. Low has been appointed General Manager of Sales of the John A. Roebling's Sons Company.

Mr. Low has been identified with the Roebling organization for thirty-two years. Upon graduation from college in 1909 Mr. Low joined the California Division of the Company at Los Angeles, serving in various sales capacities.



Mr. Low was appointed Manager of the San Francisco Branch in May, 1930, and on January 1, 1940 was elected President and General Manager of the John A. Roebling's Sons Company of California.

Mr. Low will assume his new duties on or about March 1st with headquarters at Trenton, New Jersey.

Meeting the Demand for Faster Production Industry's Answer to the Emergency

"Plant modernization offers an attractive opportunity to lighten the pressure on the labor market, to reduce costs and above all to maximize production per man-hour and man-year and make industry's contribution to defense one of the highest order" is the conclusion reached in a booklet, "Meeting the Demand for Faster Production," recently published by Farrel-Birmingham Company, Inc., machinery manufacturers of Ansonia, Conn.

According to the estimates of the authors, our wartime production needs, as measured in terms of man-hours of factory labor, must be revised upwards in the light of developments abroad. The booklet points out that:

"Wartime production needs of even twelve billion man-hours yearly, superimposed upon domestic requirements ranging in peacetime at fifteen billion man-hours, represent a total of twenty-seven billion man-hours. The increased hours of effort represent continuous production of some five million additional men, even counting a man-year as 2,400 hours. It is important to see the situation in that light; it is also useful to observe that probably not more than one-half such a number could be absorbed in manufacturing, considering both the limitations of factory floor space and the relative absence of a large supply of skilled and experienced labor. Approximate as such estimates must be, they nonetheless bring

the problem into focus.

"The gradual decline in man-hours per unit of output between 1899 and 1919 and the sharp reduction between 1919 and 1931 came to an end in 1933. Since 1933 data from that source shows that no further gains have been made on the whole in reducing the labor time per unit of output! Instead, the former trend has shown signs of reversing itself.

"Coincident with, if not the most important cause of that trend, is the sharp advance in the average age of production machinery. From six to eight machines out of each ten in important defense industries are over ten years of age and do not have the improvements developed in the last decade. That condition, if corrected, might provide an increased productivity per man-hour equivalent to adding not less than one billion and perhaps as much as three billion man-hours of effort to factory processes.

James M. Mead Appointed Philadelphia Plant Manager for Ryerson Steel Co.

Joseph T. Ryerson & Son, Inc., announce the appointment of James M. Mead to the position of Manager of the Philadelphia Plant.

Mr. Mead, one of Ryerson's most experienced steel men, was formerly Assistant Manager of the Philadelphia organization. He started with the Ryerson Jersey City plant back in 1919 and has served in many different departments.

Mr. Mead's many business contacts and diversified interests in the steel industry have won him a large group of friends in Philadelphia and vicinity who will be glad to hear of his appointment.

He succeeds Arthur C. Alshul, former manager of the Philadelphia plant for eleven years, who retired February 1st after 42 years of continuous service with the company.

Mr. Alshul has the distinction of having the longest continuous record of any one now in the Ryerson organization.

Broad Refinancing Program for Republic Steel

It was announced last month by the Republic Steel Corporation that a registration statement had been filed with the Securities and Exchange Commission covering \$90,000,000 worth of new securities for a broad refinancing program. One hundred and thirty-nine underwriters will offer the new securities to the public.

There will be \$65,000,000 20-year first mortgage sinking fund bonds and \$25,000,000 15-year convertible sinking fund debentures.

T. M. Girdler, Chairman of the Board,

stated that the new financing will greatly simplify Republic's debt structure. Annual sinking fund requirements and maturities will be reduced as compared with

present requirements of the funded debt and the saving of several million dollars in interest charges during the life of the issues will be effected.

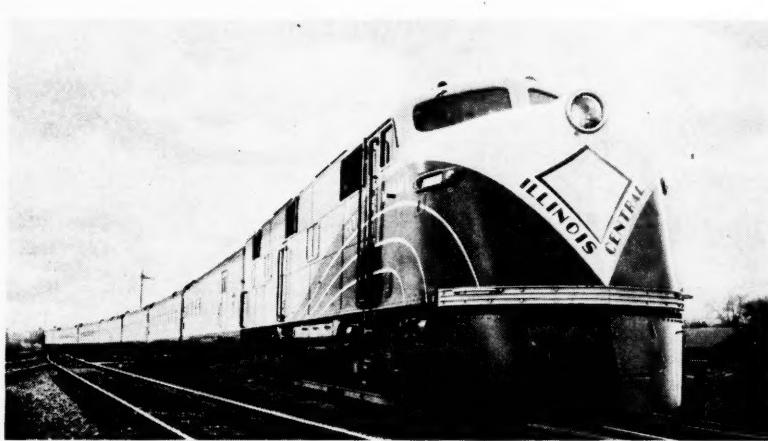
Illinois Central Installs Another Diesel Passenger Train to Serve South

The induction into service of the "City of Miami" added the world's most modern Diesel-powered passenger train to the rapidly growing fleet of streamliners with which the Illinois Central System enters the new year. The "City of Miami" is the outstanding member of a fleet of five high-speed, Diesel-engined, streamline passenger trains now in service or to be put in service within the near future.

This is the third of the Illinois Central streamline trains now in service. The "Miss Lou," making a daily round trip between New Orleans and Jackson, Miss.,

the second member of the fleet began its service on November 17, 1940 while the "Green Diamond" began its daily round trips between St. Louis and Chicago five years ago. Scheduled for early induction into service are the "Illini," to run between Chicago and Champaign, Ill., and the "Land O' Corn," to operate between Chicago and Waterloo, Iowa.

Between thirteen and fourteen thousand persons visited the "City of Miami" while it was on exhibition at Van Buren Street Station, Chicago, the day before its first run to Florida.



Modernizing Living Conditions in a Coal Mining Town

by

H. O. ZIMMERMAN

Chief Engineer,
Inland Steel Company,
Wheelwright, Ky.

THE town of Wheelwright is located in Floyd County, Kentucky, in the Big Sandy Elkhorn Coal Mining District.

The Inland Steel Company acquired the Wheelwright property in April, 1930, since when a great deal has been accom-

plished. In addition to producing coal at constantly lower costs and progressively improving our accident experience, both from a frequency and severity standpoint, at the same time, we have carried on almost continuously a construction program having as its purpose the modernization of the entire plant.

Soon after the purchase of the property, the management set up an improvement program designed to increase operating efficiency and reduce personal injuries. Speaking broadly, this program involved the construction of a new all steel and concrete tipple; head house with two-car rotary dump; refuse disposal plant; central machine shop; a cleaning plant to recover machine cuttings previously gobbed in the mine or hauled to the surface and dumped as refuse; the installation of fans and sub-stations to improve ventilation and power conditions and the purchase of new all steel mine cars. The results from these operating improvements met the expectations of the management and the production of April, 1930, of approximately 2,000 tons per eight- or ten-hour day has been increased until it now averages 6,500 tons per seven-hour day.

Contemporaneously with these operating improvements, certain other improvements were carried on having for their purpose the improvement of living conditions of the employees. These I shall briefly enumerate: A modern miners' bath house with individual steel lockers and separate quarters for the white and

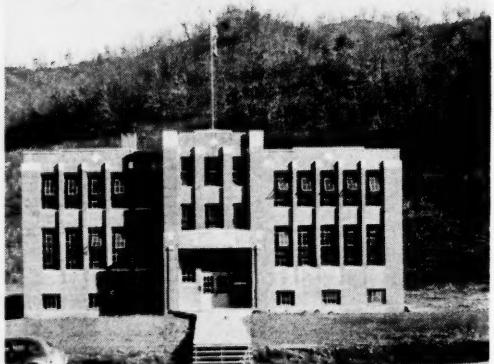
colored employees was built; a water filtration and purification plant was installed and new pipe lines laid; yard hydrants were installed to replace hand pumps at those houses which did not have modern conveniences (this water plant and the yard hydrants served for about eight years and until the general modernization program of last year, which I will refer to in more detail later). All roads in the town were hard surfaced, and concrete bridges were built to replace all wooden bridges. School facilities, which in 1930 consisted of one frame five-room building with outside toilets for the white children and one school room (the colored church) for the colored children, have been enlarged and now consist of two frame buildings and two brick buildings containing a total of thirty-one classrooms for the white children with all modern conveniences, including a gymnasium and auditorium, and a five-room building with all modern conveniences for the colored children. The town now boasts of a high school basketball and football team; also a band.

During the past several years the Company built two modern four-family apartment houses and converted a large dwelling into another four-family apartment house. In addition, we constructed five cottage type houses equipped with practically every modern convenience.

During this same period attention has also been given to improvement of medical facilities and services for employees and their families. A new hospital was erected which was equipped with a modern laboratory, X-ray machine and other equipment. The medical staff, which formerly consisted of two doctors and one nurse, is now comprised of three doctors, two registered nurses, a technician and a clerk. The medical program has gone beyond the usual proper care of the injured and sick of the community. It is making definite and rapid strides in the fields of health supervision and preventive medicine. The program embraces vaccinations against contagious disease, early diagnosis of chronic illnesses by means of thorough periodic physical examinations and active research in the community's health problems.

I have outlined in a very general sort of way most of the town and mine improvements which the Inland Steel Company made at its Wheelwright operation prior to last year. I will now describe in more detail the modernization program to improve the living conditions of its employees, which was completed last year.

The miners' houses in Wheelwright were typical mining town houses having three, four or five rooms, built on post foundations and without any so-called modern conveniences. Each house was served by an outside pit type toilet, and the water, as previously mentioned, was provided by yard hydrants, one for ap-



From the time that the property was acquired in 1930, a program of improvement constantly has been followed. Not only has the surface preparation plant (top) been modernized but new schools have been built (the Wheelwright High School is shown in center) and a new hospital erected.

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proximately every three houses. Garbage was collected at rather infrequent periods and dumped at a point not far removed from the corporate limits of the town.

There had been concern for some time about an annual epidemic of summer diarrhea in the community. The disease affected principally infants and children, but adults were occasionally seriously attacked. It was estimated that the condition was responsible for the loss of a number of man days work at the mine. The problem was studied in the summer of 1939. Representatives of the State Board of Health and the Company's medical department, working in close cooperation, planned and carried through in a thoroughly scientific way this problem in clinical research. The contributing causes of the epidemic were found to be multiple. For the most part they could be traced to improper sewage and garbage disposal while the personal shortcomings in the community's families were no doubt contributory in some cases.

Following this survey, the local management set up an elaborate improvement program which was promptly approved by Mr. Clarence B. Randall, Vice President of the Company at Chicago.

To get the program underway required a large amount of work on the part of the Engineering Department in making plans, layouts and estimates of cost, and later in the organization of construction forces and in the supervision and inspection of the actual construction.

A complete sewer system was installed to eliminate every outside toilet in the town. To accomplish this, approximately eight miles of sewer lines were laid. This presented some difficult engineering problems as the narrowness of the valley, with its congested building conditions, made it necessary for the sewer lines to cross and recross the railroad, highway and creek many times. Some sections of the sewer mains were laid under entire rows of houses so as not to interrupt traffic on those streets where no detour could be provided.

While the population of Wheelwright at present is about 2,400, the sewer system that was installed is of adequate capacity to take care of future expansion of the town up to a population of 3,600.

A modern sewage treatment plant providing primary and secondary treatment of sewage was constructed. All sewage will pass through this plant. The plant that has been installed is adequate for serving 2,400 people, but provision was made in the layout for future enlargement of this plant to take care of 3,600 people.

A modern garbage and trash incinerator was erected, and more frequent garbage collection service was established.

All houses were plumbed for water, and

the minimum improvements made to each house were a kitchen sink, hot water heater with tank and an inside flush-type toilet. Complete bathrooms were installed in about half of the houses. To a large number of houses an extra room was added, and nearly every house had at least one clothes closet or pantry added to it.

To accomplish this, the Engineering Department drew up about thirty different house addition plans from which six of the most suitable and practicable were selected. Cost figures were prepared, and from these costs future rent rates were established which provide a fair return to the Company. Incidentally this is the only part of the entire program for which any amortization has been provided as the Company will receive no additional income because of the installation of the new water system, sewer system and the sewage disposal plant.

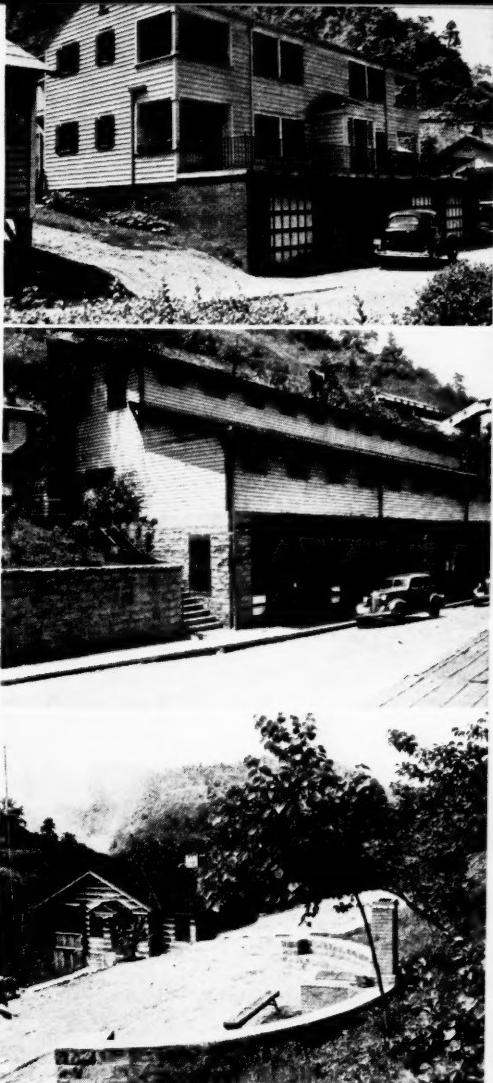
After the various plans had been selected, they were submitted to each tenant, at his house, so he could examine them. At the same time the tenant was advised of the amount of additional rent that would be charged for each improvement. The tenant was then permitted to select the plan and conveniences he desired. He was also consulted about the location of the addition in relation to the existing house, and if his idea was feasible and did not involve excessive cost or intrude upon the rights of his neighbors, it was followed.

The existing water filtration plant, while supplying pure filtered water, was inadequate, and its capacity had to be trebled. Two additional large water storage tanks were installed. Six miles of water mains and service lines were laid. Inside the mine, which is the source of water supply, a 21,000,000-gallon reservoir was provided. This was accomplished by building several dams underground and by raising a section of main line haulage track approximately 4 feet higher than its former level for a distance of 1,000 feet. This permitted the flooding of an adjacent large worked-out area which provided the reservoir.

All pumps, both underground and at the filtration plant, in connection with the new water system had to be replaced by pumps of larger capacity than those formerly used. Two booster pumps were installed to supply houses situated so high on the hillsides that they could not be reached by the existing water pressure.

Natural gas was piped to all the houses. Its use was entirely voluntary with the tenant, and his house was not piped for gas until he requested it.

For a coal mining company to do this, in our case, is not such a paradox as it may seem as the Company, when it purchased the property, acquired two gas wells, and many of the houses and all the



No effort has been spared to make living conditions as attractive as possible. At the top is shown one of the new four-family apartment houses complete with garage. Center—The new bath house which is most important adjunct of any coal mine. Below is the boy scout cabin and outdoor oven erected in one of the many attractive local settings.

public buildings were already piped for gas.

Making gas available has been a boon to the housewife, particularly during the hot summer months. It has also eliminated unsightly coal and cinder piles, which formerly cluttered up the yards.

The old moving picture theatre was completely remodeled and modernized. This provided the people of Wheelwright with an attractive, clean, comfortable and well-ventilated theatre for their recreation.

Burton, a small mining town with a population of 300 and having forty-three

(Continued on page 68)

National Defense Program Awards in the South

(January 16—February 15)

ALABAMA

Unit	Manufacturer	Item	Amount
Qtmtr. Corps	E. I. duPont de Nemours & Co., Wilmington, Del.	For construction and preparation of smokeless powder plant for operation on cost-plus-fixed-fee basis at Childersburg	\$34,997,600
Ordnance	E. I. duPont de Nemours & Co., Wilmington, Del.	For cost equipment of Childersburg plant	13,000,000
Supplies & Accts.	Hardie-Tynes Mfg Co., Birmingham	Air compressors	86,186
Qtmtr. Corps	Dunn Construction Co., Inc., Birmingham	For construction of ordnance depot at Anniston, cost-plus-fixed-fee	8,491,592
Emergency Ship Program	John S. Hodgson & Co., Montgomery (Architects and Engineers: J. B. Converse & Co., Inc., Mobile; A. C. Polk, Birmingham)	Four ways, estimated cost	1,322,500
	Alabama Dry Dock & Shipbuilding Co., Mobile		

FLORIDA

Qtmtr. Corps	Aetna Iron & Steel Co., Jacksonville	Hangar doors	45,769
Supplies & Accts.	The Glidden Co., Naval Stores Div., Jacksonville	Pine oil, rosin and tar pine	38,807
Supplies & Accts.	Miller-Dunn Co., Miami	Diving apparatus	34,260

GEORGIA

Qtmtr. Corps	Palmetto Cotton Mills, Inc., Palmetto	130,000 yds. khaki cotton duck	25,051
" "	William L. Barrell Co., Inc., N. Y. C., Agent for Aragon Mills, Aragon, Ga.	560,000 khaki cotton duck	182,952
" "	Floyd Mills, Rome, Georgia	250,000 khaki cotton duck	69,775
" "	Carwood Manufacturing Co., Winder	72,000 Cotton trousers and shirts	50,400
Supplies & Accts.	Gallaway Mills, LaGrange	Cotton canvas	56,150
Ordnance	S. B. Marks Co., Inc., Trion	Cleaning patches	307,750
"	LeTourneau Co. of Georgia, Tooeoa	Artillery ammunition	1,190,000
Yards & Docks	Callaway Mills, LaGrange	Cotton canvas	116,540

KENTUCKY

Qtmtr. Corps	The Carrell-Rogers Co., Inc., Louisville	3,435 pads	36,883
" "	W. M. Cissell Manufacturing Co., Louisville	Laundry equipment	26,701
Medical Corps	Logan Co., Louisville	Folding beds	26,730
Qtmtr. Corps	Atmospheric Nitrogen Corp., New York, N. Y. (a subsidiary of the Allied Chemical & Dye Co. of New York)	For construction of anhydrous ammonia plant at West Henderson (cost-plus-fixed fee basis)	13,600,000
Ordnance	Atmospheric Nitrogen Corp., New York, N. Y. (a subsidiary of the Allied Chemical & Dye Co. of New York)	For operation of anhydrous ammonia plant at West Henderson	1,884,195

LOUISIANA

Qtmtr. Corps	Lee Mfg. Co., Inc., Shreveport	40,000 jean khaki cotton shirts	20,000
" "	Allen Boat Co., Gretna	Distribution box boats—all steel, single screw diesel-propelled welded	204,500
Emergency Ship Program	Louisiana Shipbuilding Co., Inc., New Orleans	Six shipways and other facilities	4,841,000

MARYLAND

Qtmtr. Corps	Corman & Wasserman, Baltimore	50,000 khaki cotton trousers	29,925
Qtmtr. Corps	Fashion Cut Clothes, Baltimore	10,000 woolen service coats	40,880
Ordnance	Mt. Vernon-Woodberry Mills, Inc., Baltimore	400,000 yds. coton twill cloth	86,800
Supplies & Accts.	Revere Copper & Brass, Inc., Baltimore Div., Baltimore	Brass	1,098,546
" "	Carey Machinery & Supply Co. of Baltimore City, Baltimore	Lathes	33,984
" "	Mt. Vernon-Woodberry Mills, Inc., Baltimore	Canvas	21,647
" "	Alemite Co. of Maryland, Baltimore	Gun fittings	67,235
" "	Revere Copper & Brass, Inc., Baltimore Div., Baltimore	Copper nickel condenser tubes	50,348
" "	Locke Insulator Corp., Baltimore	Milling machines	66,273
" "	The Eastern Rolling Mill Co., Baltimore	C-R welding steel	24,825
" "	Revere Copper & Brass, Inc., Baltimore Div., Baltimore	Rolled naval brass	114,681
Yards & Docks	The Suburban Engineering Co., N. Y. C.	Diesel-engine-alternator, auxiliaries and piping at the Naval Radio Station, Cheltenham	35,678
		Aircraft float lights	98,168
Supplies & Accts.	Triumph Explosives, Inc., Elkton	Plant construction and expansion and machinery	1,685,000
Defense Plant Corp.	Bendix Radio Corp., Baltimore	Artillery ammunition components	202,950
Ordnance	Triumph Explosives, Inc., Elkton	Distribution box boats—all steel, single screw diesel propelled welded	267,500
Qtmtr. Corps	Spedden Shipbuilding Co., Inc., Baltimore	Welding electrodes	270,728
Supplies & Accts.	Reid Avery Co., Dundalk, Baltimore	Materials to furnish and install radio sets	24,547
" "	Bendix Radio Corp., Baltimore		

(Continued on page 58)

Labor Needed Will Exceed Unemployed

RECENT major increases in America's defense program will bring about a demand for labor that "will certainly exceed the number of unemployed persons in the labor market."

This conclusion has been reached by the research staff which is now making a survey of labor policy under the defense program for The Twentieth Century Fund.

Preliminary tabulations of a sample of the Census enumeration taken last year indicate that there were 5,110,000 persons completely unemployed and seeking work in the last week of March 1940. Adding 1,300,000 who had jobs but who were on temporary layoff and not actually at work, plus 2,905,919 employed on WPA and other emergency work programs, gives a total of 9,315,919. This compares with an estimate made by the National Industrial Conference Board for the same period and placed at 9,269,000. Using the same methods which proved so accurate in March, the Conference Board set the number of full-time unemployed in November 1940 at 7,217,000. The research

staff accepts the probable accuracy of this figure and after deducting the estimated workers on government projects, those on temporary layoff, and those likely to be affected by the draft, the Fund staff now says that "the number of idle workers in the labor market available for employment in the near future is probably not far from 4,000,000."

"On the basis of 1940 appropriations it seemed reasonable to predict an increase in employment of around 6,000,000 between the fall of 1940 and the fall of 1942. Under the expanded program one can say merely that—barring an early peace—the increase will be larger than this," and the staff believes it will certainly exceed the available labor supply.

"It does not follow, however," says the report, "that all will be well until the present unemployed have been completely absorbed, and that we will then be faced with a sudden and absolutely 'general shortage' of labor." Severe shortages already exist in certain lines and certain parts of the country, especially in the skilled trades, while there are large sur-

pluses of workers in other lines and other sections. The staff believes this unevenness will continue and estimates that there may be one or two million unemployed persons even at the peak of armament production. Under the original program the peak of production and employment would be reached in 1942, but under the enlarged program the staff believes "the rising trend of employment will continue beyond 1942 and reach a higher peak at some later date."

Since the present visible supply of unemployed is clearly unequal to this probable demand, the staff says, "A large part of the increased requirements will have to be met by workers not previously in the labor market. There will be a net addition of more than a million to the working force during the next two years through the normal excess of new workers over retirements. Several million women workers entered industry during the World War, and this experience may be repeated during the next few years. There is a considerable reservoir of unused labor in agriculture. A marked expansion of industry could probably draw at least two million persons out of agriculture without reducing agricultural production. The labor force may also be expanded in the vertical direction through an increase in the hours worked."

Large Ladles for T.C.I.'s Ensley Plant

An accompanying illustration shows a ladle fabricated for the Tennessee Coal, Iron and Railroad Company for use at Ensley, Alabama, by the Chicago Bridge and Iron Company, Chicago, Ill. The



ladle is 11-feet, 3 3/4 inches in diameter and 12 feet deep. It is one of 10 similar ladles which the Chicago Bridge and Iron Company has fabricated at its Birmingham, Alabama, plant.

Addison C. Armstrong Joins Worthington

Addison C. Armstrong has joined the

Worthington Pump and Machinery Corporation's organization at its Holyoke, Massachusetts, Works, as Manager of the Ordnance Division. He will be directly in charge of the production of ordnance equipment at that plant.

Mr. Armstrong was formerly affiliated with the Truscon Steel Company as a departmental manager. Previous to that he was associated with the Bartlett-Hayward Company and the Campbell

Metal Window Corporation, both of Baltimore, Maryland.

Bethlehem Completes New Office Building at Maryland Plant

A new office building to house 650 workers has just been completed at Bethlehem Steel Company's Sparrows Point, Md., plant. The building is steel frame construction faced with red brick and trimmed with limestone. The main lobby, elevator corridor and executive offices are sheathed in steel and finished with walnut grain.



Two Months Total High as February Contracts Soar

FEBRUARY saw great strides made in Southern construction, as newly initiated work placed under contract mounted to \$195,880,000, a thirty-eight per cent increase over January.

Seventy-four per cent of the February total, according to studies of reports published in the CONSTRUCTION DAILY BULLETIN, represented industrial expansion and a substantial increase in privately financed building. This is an upsurge of remarkable proportions and surpasses the record for industrial and privately financed building work over a long period.

The accumulation of contracts awarded so far this year is \$337,597,000, as compared with \$124,575,000 for the first two months of the all-time banner year of 1940.

The total of contracts for new and expanding industrial plants located in the sixteen States below the Mason and Dixon line reached a peak with a February valuation of \$126,472,000. This ranks high in the industrial history of the South.

Private building in February more than doubled. The \$18,522,000 for such work represented the highest point reached since last April. Residential work in that month just slightly outdistanced the \$13,564,000 value of such work listed in current February contracts.

Road contracts jumped to \$11,520,000, a figure more in keeping with the monthly average of the preceding year than the \$6,370,000 low point to which such contracts dipped in January.

A highlight survey of the industries mainly responsible for the huge indus-

trial contract total shows great shipyards being established on both the South Atlantic and Gulf coasts; steel plants expanding to handle requirements of both these shipbuilding activities and of a tremendously increased construction for defense; a rolling mill for aluminum to supply rising aircraft production; power stations to generate electricity to run the myriads of machines operating night and day under the "all-out" program.

Most recently announced among the steel projects was the \$17,000,000, 200,000-ton ingot steel plant proposed for Houston, Texas, by the American Rolling Mill Co., and a \$5,000,000 program for

Half the roofing is shown below laid on the \$7,000,000 plant North American Aviation, Inc., is constructing near Dallas, Texas. With construction slated early in April, the plant will have a monthly production capacity of 300 planes. The plant is said to be the first decentralized unit under the national defense program. The cantilever section in the background will provide an obstruction-free space 270 by more than 900 feet long for final assembly. This windowless building is understood to be the largest air conditioned factory in the world. It will have no skylights; will be lighted fluorescently. Allen and Kelly, of Indianapolis, are the architects; J. Gordon Turnbull, the consulting engineer; James Stewart and Co., general contractor.

new additions for the same company at Ashland, Ky.

Weirton Steel Co. announced contracts for coke ovens and a by-product plant at Weirton, W. Va., cost being placed at \$5,000,000. Bethlehem and United States Steel had already embarked on programs of huge additions at Baltimore and Birmingham.

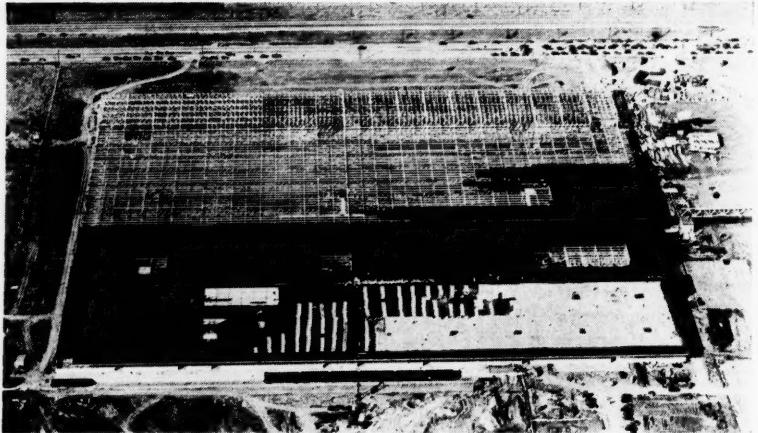
Newest and largest shipyard project was covered under a \$7,838,000 contract cleared by the National Defense Advisory Commission, by which an existing shipyard and a car building plant at Baltimore will be taken over as the nucleus of facilities to be operated under Bethlehem's shipbuilding division in constructing 50 standardized cargo vessels for the United States Maritime Commission.

A \$4,841,000 contract between the Commission and the newly organized Louisiana Shipbuilding Co., New Orleans, provided for construction of six ways for constructing at least 25 of the same type ships. Contractors for the new \$1,000,000 Wilmington, N. C., plant of North Carolina Shipbuilding Co., Newport News Dry Dock and Shipbuilding affiliate, made awards for preliminary work.

Tampa Shipbuilding Co., Tampa, Fla., was designated naval repair and building

*shipyards,
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*74 per cent
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yard, plans at the same time being approved for a \$1,000,000 plant expansion, as contracts were being cleared through the Advisory Commission for naval and merchant vessel work estimated to cost in the neighborhood of \$20,000,000. Four new ways at the Mobile plant of Alabama Dry Dock and Shipbuilding Company will cost \$1,322,000.

In the aircraft field preparations were being made for establishing big bomber assembly plants at Tulsa, Okla., Kansas City, Mo., and Fort Worth, Texas, the first to be operated by Douglas Aircraft Co., the second by North American Aviation, Inc., and the third by Consolidated Aircraft Corp.

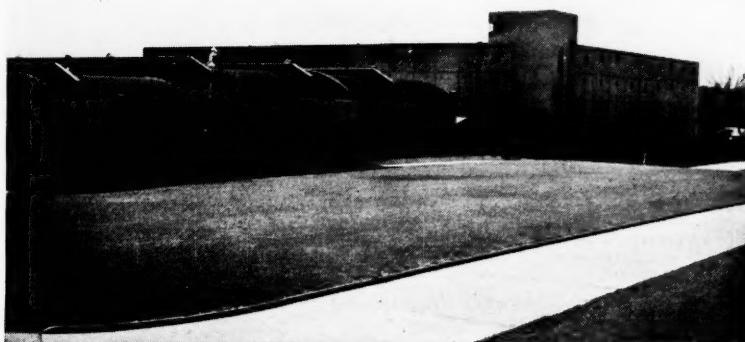
Simultaneously Glenn L. Martin Co., Maryland aircraft concern, was rushing a \$24,000,000 enlargement program at its Middle River plant including erection of an entirely separate factory about a mile distant, as well as doing the preliminary work on an Omaha, Nebr., bomber assembly project similar to the Oklahoma, Missouri and Texas projects. Texas was the site of a second big North American Aviation project, and at Nashville, Tenn., Vultee Aircraft, Inc. expanded newly finished facilities at a \$5,000,000 cost.

Reynolds Metals Corp., already completing a huge virgin aluminum plant at Sheffield, Ala., as the country's second enterprise to enter this field, was commissioned to proceed with construction of a \$12,000,000 rolling mill in that connection. The company previously had received \$2,500,000 for supplementary work at new Louisville, Ky., additions, and an affiliate awarded additional contracts for a \$1,000,000 fuse loading plant at Macon, Ga.

The largest project in the chemical field was a \$13,000,000 anhydrous ammonia plant to be constructed at Henderson, Ky., under a contract signed by the War Department and a subsidiary of Allied Chemical & Dye Co. Shell Oil Co. let the contract for constructing its Houston plant to produce butadiene, a basic ingredient of synthetic rubber. National Carbide Corp. is reported to be planning a \$1,000,000 calcium chloride and acetylene gas plant at Louisville, Ky. Reports from Houston, Texas, described a \$12,000,000 defense material production plant to be established there and operated by Hughes Tool Co. Contract was being placed for the \$20,000,000 bag loading plant to be operated at Chilversburg, Ala., in conjunction with the DuPont smokeless powder plant being built there.

Gas pipeline construction started anew, with Southern Natural Gas Co., Birmingham, Ala., letting contracts for a \$2,200,000, 135-mile line to connect newly developed gas leases with the existing terminus of its system in the Monroe field of Louisiana. Kentucky & West Virginia Gas Co. is making preliminary investigations in connection with a 200-mile gas line from Floyd County, Kentucky, to northern West Virginia. Stanolind Oil & Gas Co. is to construct a \$500,000 plant recycling gas in the South Jennings field of the same state.

Important programs in utilities expansion were announced for Virginia, Kentucky, Maryland, Georgia, Florida and Alabama. The first was announcement of



Illustrated above is the new \$250,000 warehouse of the Armstrong Tire & Rubber Co., Natchez, Miss. Erected in 104 calendar days by the Jacksonville, Fla. concern of Hillyer & Lavan, the 200 by 200-ft. structure is five floors high and contains 200,000 sq. ft. of space, or sufficient to hold 300,000 tires.

the \$9,024,000, 1941-1942 program of Virginia Electric & Power Co. Work at this company's Norfolk Reeves Avenue station is to cost \$4,025,000. Louisville Gas & Electric Co., Louisville, Ky., acquired a 50-acre site and announced plans for a \$5,600,000 steam electric plant. Sub-station facilities were proposed at Baltimore by Consolidated Gas Electric Light & Power Co. as preliminary construction was ready to start on a \$6,500,000 generating plant at Riverside. Capacity of Georgia Power Company's \$4,000,000 plant now under construction at Macon will be doubled by an additional expenditure of \$2,600,000.

Florida Power & Light Co. will double capacity of its Miami Beach generating plant, cost \$2,500,000. A third of the \$6,500,000 1941 program of Alabama Power Co. will go into the new steam plant now under way at Chickasaw.

Marking the increasing demand for fluorescent lighting, Westinghouse Elec-

tric & Manufacturing Co., East Pittsburgh, Pa., announced plans for constructing a \$3,000,000 plant to produce the tubular lamps at Fairmont, W. Va. The company is erecting a \$700,000 building at Atlanta also.

Developments in the iron and steel field included studies of Woodward Iron Co., Birmingham, on the possibilities of opening a new red ore mine involving investment of \$2,000,000. Award of contract for a tin mill at Sparrows Point, Baltimore, by Bethlehem Steel Co., which also started on new pipe mill facilities.

Many other projects were announced or placed under way. Among these were: A \$750,000 improvement of Richmond, Va., facilities by Seaboard Air Line; a \$496,000 program of McDonnell Aircraft Corp., St. Louis, for making airplane parts; a \$350,000 roofing plant at North Kansas City, Mo., for Lloyd A. Fry Roofing Co.; a \$256,000 bottle and jar plant at Palestine, Texas, for Knox Glass Bottle Co., of Jackson, Miss.; Humko Company's \$200,000 expansion at Memphis, Tenn.; a \$130,000 surgical dressing plant at Greenville, S. C., for Convience, Inc., and a \$126,000 building for the Herald Publishing Co., Miami, Fla.; a \$100,000 steel fabricating plant at Port Arthur, Texas, proposed by Sabine Steel & Construction Co.

Statistics of South's Construction

	February, 1941 Contracts Awarded	Contracts to be Awarded	Contracts Awarded First Two Months 1941
PRIVATE CONSTRUCTION BUILDING			
Assembly (Churches, Theatres, Auditoriums, Fraternal)	\$2,117,000	\$1,935,000	\$3,563,000
Commercial (Stores, Restaurants, Filling Stations, Garages, etc.)	2,285,000	1,087,000	4,196,000
Residential (Apartments, Hotels, Dwellings)	13,561,000	5,931,000	17,914,000
Office	556,000	655,000	934,000
	\$18,522,000	\$9,608,000	\$26,607,000
INDUSTRIAL			
	\$126,472,000	\$97,573,000	\$202,361,000
PUBLIC CONSTRUCTION BUILDING			
City, County, State, Federal	\$21,621,000	\$80,773,000	\$60,631,000
Housing	11,158,000	43,337,000	18,723,000
Schools	2,437,000	7,076,000	3,886,000
	\$35,216,000	\$131,186,000	\$83,240,000
ENGINEERING			
Dams, Drainage, Earthwork, Airports	\$1,355,000	\$33,460,000	\$2,232,000
Federal, County, Municipal, Electric	1,888,000	2,600,000	3,779,000
Sewers and Waterworks	907,000	12,858,000	1,488,000
	\$1,150,000	\$48,918,000	\$7,499,000
ROADS, STREETS AND BRIDGES			
	\$11,520,000	\$22,743,000	\$17,890,000
TOTAL			
	\$195,880,000	\$310,028,000	\$337,597,000

New Industrial Plants and Expansions in the South During February, 1941

Contracts Awarded

Ala., Andalusia—Alabama Textile Products Corp.; warehouse	
Ala., Childersburg—Coosa River Ordnance Plant; bag loading plant (government owned)	\$20,000,000
Ala., Lister—Reynolds Metals Co.; rolling mill (government owned)	
Ala., Mobile—Maritime Commission; shipbuilding facilities	1,322,000
Ala., Sheffield—Reynolds Alloys Co.; aluminum rolling mill	12,000,000
Ark., Little Rock—Finkbeiner Christian Meat Packing Co.; remodeling	25,000
Ark., Little Rock—J. A. Riggs Tractor Co.; remodeling	17,000
Ark., Norfolk—Arkansas Power & Light Co.; sub-station	50,000
Fla., Miami—S. C. Davis Construction Co. (contractor); factory building	10,000
Fla., Miami—Miami Herald Publishing Co.; building	126,000
Fla., Miami Beach—Florida Power & Light Co.; expansion	275,000
Fla., Pensacola—Weis-Fricke Mahogany Company; dry kiln	
Ga., Atlanta—Cluett Peabody Co., Inc.; addition	
Ga., Atlanta—Georgia Art Supply Co.; plant	
Ga., Atlanta—Southern Mills, Inc.; office and platform	
Ga., Atlanta—Swift & Company; refinery	
Ga., Rome—Tubize Chatillon Corp.; extension foundations	15,500
Ga., Rossville—Peerless Woolen Mills; addition	
Ky., Ashland—American Rolling Mill Co.; blast furnace	5,000,000
Ky., Henderson—Ohio River Ordnance Works; ammonia plant (government owned)	13,600,000
Ky., Lexington—Pepsi-Cola Bottling Co.; plant	30,000
Ky., Louisville—Louisville Gas & Electric Co.; power plant	5,600,000
Louisiana—Southern Natural Gas Co.; pipe line	2,200,000
La., New Orleans—Louisiana Shipbuilding Co.; shipways (government owned)	4,841,000
La., Shreveport—Shreveport Stockyards Co.; stockyards	30,000
Md., Baltimore—Frankfort Distilleries, Inc.; sprinkler tank	
Md., Baltimore—Maryland Dry Dock Co.; building	
Md., Middle River—Glenn L. Martin Co.; expansion	
Md., Sparrows Point—Bethlehem Steel Co.; pipe mill addition and clockhouse	
Md., Sparrows Point—Bethlehem Steel Company; tin mill	
Md., Sparrows Point—Patapsco & Back River Railroad; freight station and offices	
Miss., Columbus—Columbus Garment Co.; warehouse	
Miss., Tupelo—Mid-South Packing Company; plant	
Mo., North Kansas City—Lloyd A. Fry Roofing Co.; plant	
Mo., St. Louis—Anheuser-Busch, Inc.; stock house	
Mo., St. Louis—Everhardt Last Co.; factory addition	
Mo., St. Louis—General Engineering & Manufacturing Co.; factory addition	
Mo., St. Louis—Krey Packing Co.; alterations and additions	
Mo., St. Louis—McDonnell Aircraft Corp.; airplane parts plant	
Mo., St. Louis—Missouri Pacific Railroad Co.; equipment	
Mo., St. Louis—John Nooter Boiler Works; addition	
Mo., St. Louis—Wright Specialty Manufacturing Co.; plant	
N. C., Charlotte—Lance, Inc.; improvements	
N. C., Charlotte—Swift & Company; addition	
N. C., Draper—Marshall Field Manufacturing Co.; dye house	
N. C., Greensboro—Burlington Mills; office addition	
N. C., Hickory—Whisman Hosiery Mill; plant addition	
N. C., Lexington—Burlington Silk Mills Corp.; addition	
N. C., Raleigh—Pepsi-Cola Bottling Co.; plant	
N. C., Roxboro—Longhurst Cotton Mills; waste storage warehouse	
N. C., Thomasville—Coca Cola Company; plant remodeling	
N. C., Wilmington—North Carolina Shipbuilding Co.; shipyard	
S. C., Rock Hill—Rock Hill Printing & Finishing Co.; steam generating unit	
Tenn., Memphis—Humko Company; plant expansion	
Texas—Hunt Oil Company; new plant units	
Tex., Amarillo—C. J. Fowlston; locker and cold storage plant	
Tex., Austin—Lockhart Superior Dairies; dairy	
Tex., Bay City—Southwestern Bell Telephone Co.; plant and dial system	
Tex., Dallas—Jaggers-Chiles-Stovall, Inc.; building	
Tex., Fort Worth—Texas Electric Service Co.; sub-station	
Tex., Harlingen—Swed Distributing Co.; bottling plant	

Tex., Houston—Shell Oil Company; butadiene plant	
Tex., Houston—Wyatt Metal & Boiler Works; plant	16,000
Tex., Marshall—Marshall News-Messenger; plant	
Tex., San Antonio—Swift & Company; improvements	
Tex., Seguin—Guadalupe Locker Storage Corp.; cold storage plant	40,000
Tex., Sherman—Kraft Cheese Company; addition	15,000
Va., Norfolk—Norfolk Southern Bus Corp.; bus terminal	250,000
W. Va., Weirton—Weirton Steel Co.; coke ovens	5,000,000
South—Chesapeake & Ohio Railway; equipment	330,000
South—Tennessee Coal, Iron & R. R. Co.; cars	
Contracts Proposed	
Ala., Birmingham—Woodward Iron Co.; ore mine	\$2,000,000
Ala., Decatur—Ingalls Iron Works Co.; expansion	250,000
Ala., Sheffield—E. I. duPont de Nemours & Co., Inc.; synthetic rubber production plant	
Arkansas—Lion Oil Refining Co.; pipe line	225,000
Arkansas—National Lead Company; barite plant	
Ark., Mammoth Spring—Chester B. Franz Company; equipment	
Ark., Maumee—Ozark Zinc Mining Co., Inc.; zinc mine	
Fla., Hollywood—Florida Fiber Products Co.; ramie development	
Fla., Miami—Berner-Pease, Inc.; warehouse	30,000
Fla., Miami—Dade Litho & Printing Co.; factory building	
Fla., Milton—Standard Ribbon Co.; ribbon plant	
Fla., Tampa—Tampa Shipbuilding Co.; plant expansion (government owned)	1,000,000
Ga., Macon—Georgia Power Company; steam plant	4,000,000
Kentucky—Kentucky & West Virginia Gas Co.; pipe line	
Ky., Lexington—Kentucky-Illinois Hemp Co.; plant	40,000
Ky., Louisville—National Carbide Corp.; calcium chloride plant	1,000,000
Ky., Louisville—Reynolds Metals Co.; extrusion plant (government owned)	2,500,000
Louisiana—Stanolind Oil & Gas Co.; recycling gas	500,000
La., New Orleans—Flintkote Company; addition	
La., New Orleans—Jackson Brewing Co.; office and shops	
La., New Orleans—Southern Pecan Co., Inc.; factory	
Md., Baltimore—Crown Cork & Seal Co.; building foundation	
Md., Baltimore—Shell Oil Co., Inc.; warehouse	
Md., Fairfield—Bethlehem Steel Co.; shipbuilding plant (government owned)	7,838,000
Miss., Gulfport—Mac-Smith Garment Co., Inc.; factory building	
Miss., Yazoo City—Paluxy Asphalt Company; refinery	250,000
Mo., St. Louis—Concordia Publishing House; addition	45,000
Mo., St. Louis—Mario Coil Company; factory and office addition	
Mo., St. Louis—Reynolds Metals Co.; tin foil labels plant	
S. C., Cheraw—Southern Flour Mills; feed mill	
S. C., Greenville—Convenience, Inc.; surgical bandage plant	130,000
Tex., Corpus Christi—Central Power & Light Co.; addition	
Tex., Dallas—Diamond Alkali Co. of Texas; chemical plant	
Tex., Fort Worth—Cyclone Fence Company; plant and warehouse	
Tex., Houston—American Rolling Mill Co.; steel plant (government owned)	60,000
Tex., Houston—Hughes Tool Co.; defense production plant	12,000,000
Tex., Houston—Mosher Steel Company; plant	
Tex., Palestine—Knox Glass Bottle Co.; plant	256,000
Tex., Port Arthur—Sabine Steel & Construction Corp.; steel plant	100,000
Tex., San Antonio—Bernard Brown & V. L. Cameron; cheese plant	15,000
Tex., San Antonio—Cyclone Fence Company; factory and warehouse	60,000
Tex., San Antonio—W. W. West; laboratories building	
Tex., Texas City—Tin Processing Corp.; tin smelter	3,500,000
Virginia—Virginia Electric & Power Co.; expansion	
Va., Narrows—Celanese Corporation of America; extension facilities	
Va., Pearisburg—Celanese Corp. of America; expansion	500,000
Va., Richmond—Seaboard Air Line Railway; railroad	
Va., Scottsville—Louis J. Eyre & Campbell Holt; cheese plant	750,000
Va., Winchester—Baltimore & Ohio R. R.; rebuilding	
W. Va., Fairmont—Westinghouse Electric & Manufacturing Co.; plant	3,000,000
W. Va., Huntington—Appalachian Electric Power Co.; substation	
South—Maritime Commission; shipways	15,000,000

5 NEW INTERNATIONAL Industrial WHEEL Tractors

• Here are International Harvester's latest products for the men who use industrial power—five brand-new International Industrial WHEEL Tractors. These "I" Tractors, added to the line of International TracTractors and Power Units announced in 1940, make standardization on International Industrial Power more profitable than ever.

Three of these new "I" models have carburetor-type engines—two have International quick, easy-starting, full Diesel engines. They are streamlined, efficient, economical—ready to cut costs to the bone on a wide variety of jobs.

Contractors, counties and townships, cities and villages, airports, parks, cemeteries, golf courses, railroads, public utilities, factories, lumber and building supply yards,

etc., will find these new Internationals useful, handy, and economical on a wide variety of construction, maintenance, materials-handling, and transportation work.

All these tractors have Tocco-hardened crankshafts, pressure lubrication, replaceable cylinders, five forward speeds up to 15 m.p.h., gear drive, countershaft brakes that can be individually controlled or interlocked, provision for mounting a variety of allied equipment, and many other features.

See these tractors at first hand. Watch them perform on the job. Ask the nearest International Industrial Power dealer or Company-owned branch for full information.

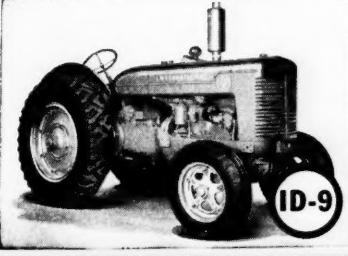
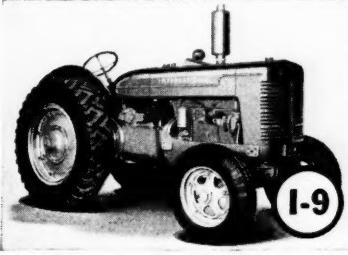
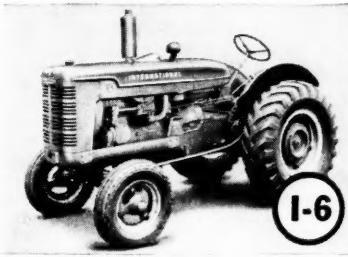
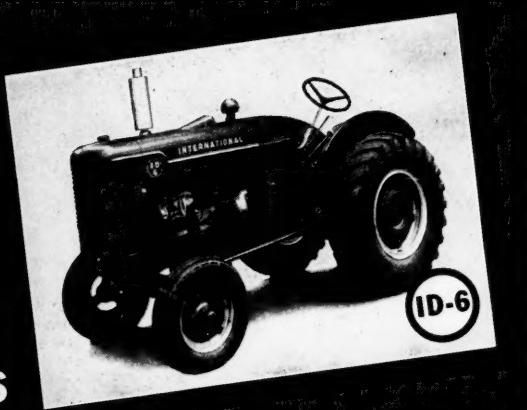
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue, Chicago, Illinois

"I" Tractor Facts

I-4—4-cylinder valve-in-head gasoline engine. Bore and stroke $3\frac{3}{8} \times 4\frac{1}{4}$ in. 5 forward speeds up to 15 m.p.h. Develops 29.5 engine h.p. at 1,650 r.p.m.
I-6—4-cylinder, valve-in-head gasoline engine. Bore and stroke $3\frac{3}{8} \times 5\frac{1}{4}$ in. 5 forward speeds up to 14 m.p.h. Develops 40.5 engine h.p. at 1,450 r.p.m.
ID-6 DIESEL—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke $3\frac{3}{8} \times 5\frac{1}{4}$ in. 5 forward speeds up to 14 m.p.h. Develops 38.5 engine h.p. at 1,450 r.p.m.
I-9—4-cylinder, valve-in-head gasoline engine. Bore and stroke 4.4×5.5 in. 5 forward speeds up to 15 m.p.h. Develops 54 engine h.p. at 1,500 r.p.m.
ID-9 DIESEL—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke 4.4×5.5 in. 5 forward speeds up to 15 m.p.h. Develops 51.5 engine h.p. at 1,500 r.p.m.

"I" Tractor Applications for Factories and Foundries

The new International WHEEL Tractors have many uses around factories and foundries. These include handling materials with cranes and hoists, pulling trailer trains, inter-plant hauling, snow removal, construction work, and sweeping.

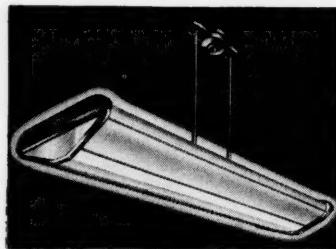


INTERNATIONAL Industrial Power

New Methods

Refined Fluorescent Lighting

Claimed to be the ultimate in refinement for any fluorescent lighting installation where T-12 (1½-inch) lamps are used in open type fixtures, the Guth "P-F-C" plastic diffusing strips "snap on" fluorescent lamps "to snap up" fluorescent lighting." These strips were developed by The Edwin F. Guth Company, St. Louis, Mo., and are said to reduce lamp brightness 30 per cent while transmitting more light than glass panels. They are also claimed to be safer. Made of shatter-



Guth Excelux Fluorescent, New Luminaire Development for Office and Store Lighting

proof plastic, they are light in weight and are held securely on lamps with strong clamps that easily snap on or off. Richly grained and trimmed with decorative fluting, the new "P-F-C" strips, in white, pink and yellow, add to the beauty of the fixture, the white being used on general illumination applications for eye-ease, while the yellow strips with white lamps and the pink strips with daylight lamps give life and tone to fluorescent lighting.

Irvington Varnished Fiberglas

In view of a growing interest in the use of woven glass as an insulating material, it is significant to note that a glass cloth, impregnated and coated with heat resisting varnishes developed for this purpose, is now available for use as insulation by manufacturers of electric motors, generators and similar equipment. Known as Irvington Varnished Fiberglas, this new insulation material is furnished in full-width rolls and tape of various widths and thicknesses by the Irvington Varnish & Insulator Company of Irvington, N. J. The material consists of a woven glass cloth base (Owens-Corning Fiberglas), impregnated and coated with a special varnish which greatly increases its resistance to abrasion, impact, and increases its overall mechanical strength.

For Fastening Metal Sheets

In earlier days of the manufacture of all-metal aircraft, metal sheets were secured to each other and to the framework by small screws or bolts while riveting proceeded. More recently, The Cleveland Pneumatic Tool Company, having acquired rights to manufacture from a French inventor, and after the expenditure of considerable sums of money in perfecting the device, placed on the market

the Cleco "Sheet Holder" which eliminates the need for holding screws and bolts. This sheet holder consists of a small steel cylinder, provided at one end with a pilot which enters the matched holes in two adjacent sheets, and with a spring-actuated plunger so arranged as to clasp and hold the sheets firmly together. Cleco sheet holders are made in sizes 3/32-inch, 1/8-inch, 5/32-inch, and 3/16-inch.

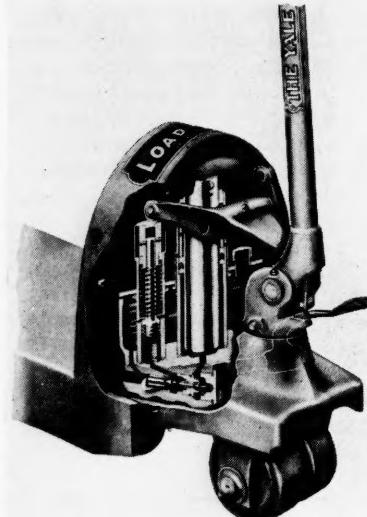
Yale "Load King" Hydraulic Hand Lift Truck

Following years of experimental design and many grueling field tests, engineers of The Yale & Towne Manufactur-

tion in narrow aisles and congested areas. Its compactness, combined with short turning axle, makes it particularly adapted to working in close quarters. The center-control and short turning axle are both Baker developments covered by patents owned by the company. The 2000-pound capacity truck is furnished to handle loads up to 60 inches in length and the 3000-pound capacity model is furnished for loads up to 42 inches in length. Seventy-two inches is the standard simple lift and 119 inches the standard telescoping lift. Frame of the model is fabricated of high tensile steel by arc welding and hot riveting, and the main sills are deep section flange plate members running from end to end. Power is supplied by a hydraulic jack, the piston movement being compounded by a pair of chains and sprockets. Drive tires are 22 by 6 and trail tires 15 by 5.

Type 16 CP Diesel Engine

Incorporating the latest developments in construction, improved design and combustion control, Type 16 CP Diesel Engine has been introduced by the Chicago Pneumatic Tool Company, New York, N. Y. The engine is of the four-cycle, direct injection type, especially designed for continuous duty. It is acclaimed a worthy addition to the famous CP Diesel engine line, with a background of more than 30 years of oil engine experience in its de-

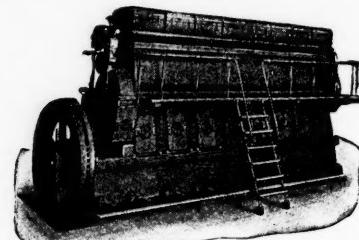


Hydraulic "Load King" Hand Lift Truck

ing Company, Philadelphia Division, offer industry the "Load King" hydraulic hand lift truck, claimed to be perfectly balanced and featuring easier lift, easier steer, greater safety to operator, lower maintenance and controlled lowering of loads. The unit is built for continuous heavy-duty service and comes in capacities of 3,500, 5,000, 6,000 and 8,000 pounds. All parts are specially made for hand lift truck service, while the design makes use of every construction feature essential to perfect heavy-duty hand lift truck operation.

New Baker Fork Truck

Announcing the latest addition to its line of industrial trucks, the Baker Industrial Truck Division of the Baker-Raulang Company, Cleveland, Ohio, introduces its new type JOM Center-Control Fork Truck, available in 2,000 and 3,000 pound capacities and designed for opera-

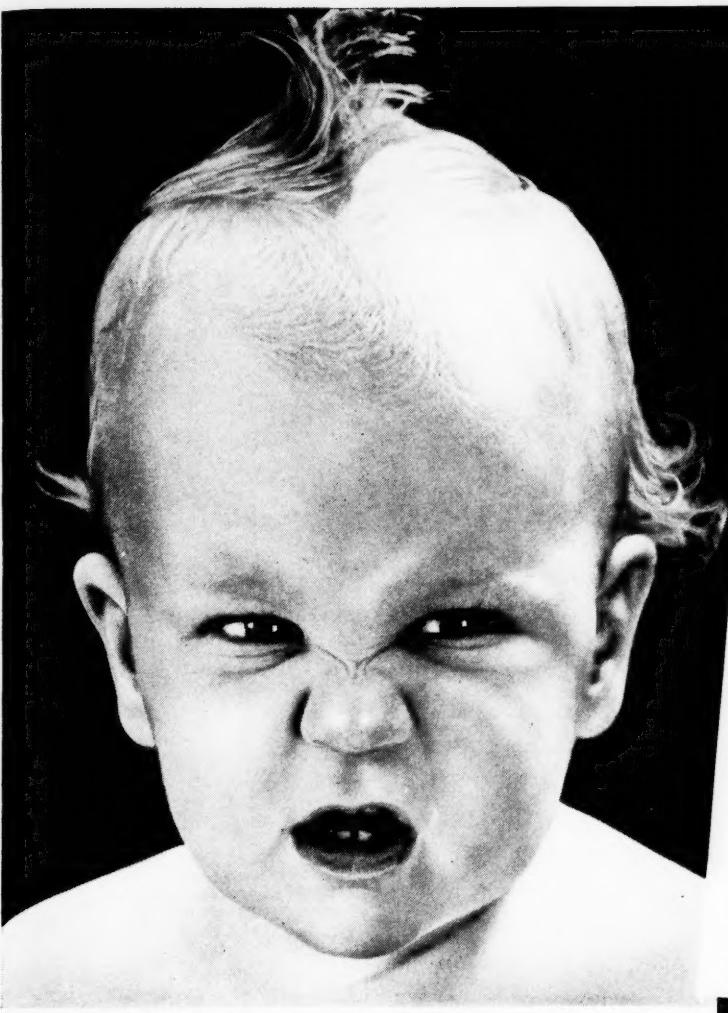


Modern CP Diesel Engine for Heavy Duty Service

sign and manufacture. CP Type 16 Diesel is of the heavy duty type, with 3 to 8 cylinders, 375 to 1,000 horsepower, and is convertible to gas. Salient features claimed for the unit are: greater fuel economy, construction to insure long life and low maintenance, wearing parts completely enclosed, positively and automatically lubricated, simple and efficient fuel system, easy starting, etc.

Improved Air-Circulator

Wagner Electric Corporation, St. Louis, Mo., announces a new air-circulator for 1941, improved both in appearance and performance, with wide, quiet-type blades, and a highly efficient 2-speed, induction type motor. It is available in 24-inch and 30-inch sizes.



Johnny's pretty peeved!

He's tired of being half
an orphan!

Daddy went away on
business three days ago.
No word since. No even-
ing romp for Johnny.
Mother's sort of lonely,
too, and a wee bit worried.

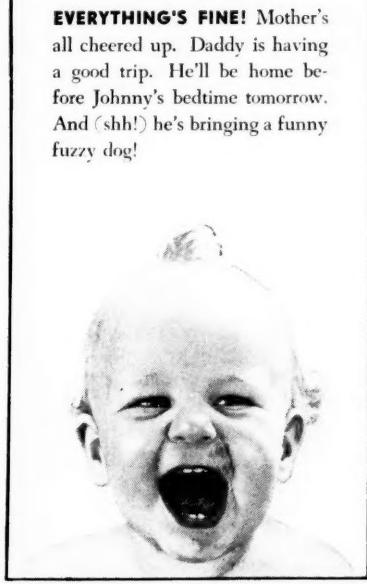
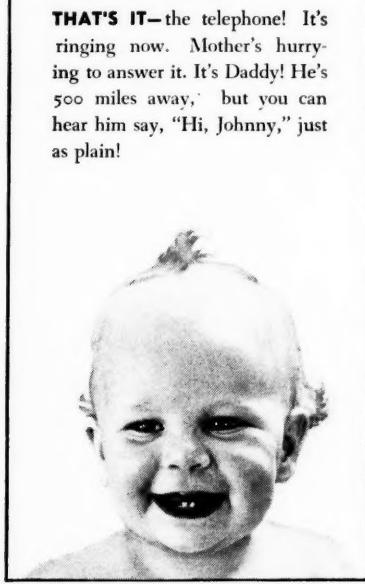
*Why doesn't
somebody do some-
thing about it?*



WAIT A MINUTE! When Mother misses her folks — what does she do? They live a long way from Mother. . . . Certainly Daddy misses Mother and Johnny. There must be a way.

THAT'S IT—the telephone! It's ringing now. Mother's hurry-
ing to answer it. It's Daddy! He's
500 miles away, but you can
hear him say, "Hi, Johnny," just
as plain!

EVERYTHING'S FINE! Mother's
all cheered up. Daddy is having
a good trip. He'll be home be-
fore Johnny's bedtime tomorrow.
And (shh!) he's bringing a funny
fuzzy dog!



LONG DISTANCE RATES TO MOST POINTS ARE REDUCED AFTER 7 P.M. AND ALL DAY SUNDAY

MARCH NINETEEN FORTY-ONE

New Methods and Equipment

Scientific Odor Control to Reduce Air Conditioning Costs

Presenting engineering data of vital importance to those interested in air conditioning, Bulletin 111, recently published by the Dorex Division, W. B. Connor Engineering Corporation, New York City, tells what positive, scientific "odor control" contributes in terms of savings to central heating and cooling systems. Detailed comparisons are made between the cost of heating and cooling outside air as against recirculating conditioned air through Dorex Activated Carbon Odor



Section of Air Duct Showing Assembly of Dorex Activated Carbon Canisters

Adsorbers. Dorex Odor Adsorbers, when applied to the recirculated air, permit a reduction in the outside air supply to 3 to 5 cubic feet per minute per occupant (more than ample for oxygen requirements) and thereby provide air conditioning comforts at considerably reduced costs. These adsorbers, which may be applied to existing as well as new air conditioning systems, are the commercial application of the gas mask principle. Employing specially processed, highly activated Dorex coconut shell carbon, they adsorb, or more simply, extract and hold odorous gases and vapors in a condensed state. Upon saturation the carbon may be economically reactivated and reused.

Fybr-Tech Panel

Recently developed by Technical Plywoods, Chicago, Ill., Fybr-Tech panel is declared to have "unlimited industrial uses." The new product consists of a vulcanized fibre, resin bonded on both sides to a veneer core. As it is non-splitting, non-checking and resistant to cuts and scratches, in addition to being very tough, it makes an excellent face. The product may be worked with ordinary tools and can be bent to a radius of one half-inch. In a recent competition, Fybr-Tech was awarded a prize for an exhibit of a luggage rack fabricated from the panelling. The luggage rack has been installed on 600 Greyhound coaches and incorporates

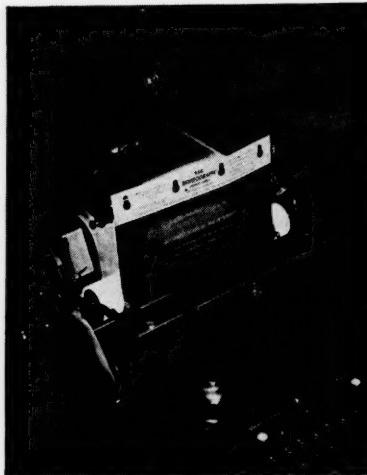
some interesting features. It was selected because it is sufficiently sturdy to withstand rough treatment, is lighter than aluminum, and is easy to work.

Porous Chrome Hardening

Recently organized by Hendrik van der Horst to introduce in America his patented process of "Porous Chrome Hardening" for cylinder walls, piston rings, bearings, etc., the van der Horst Corporation of America has established headquarters at Olean, N. Y., where a new plant has been built and is in full operation after three months of experimental work. Acting on the theory of Ricardo, the British Diesel expert, that cylinder wear is mainly caused by corrosion rather than by friction, and mindful of the great resistance of chromium to corrosion, Mr. van der Horst began his first experiments in chrome-plating engine cylinders. The problem of developing a coating sufficiently porous in texture to hold lubricating oil was a major one, but his efforts were finally rewarded. In Europe the process is in wide and growing use, it is said, for Diesel, gasoline and steam engines, and for other machinery units. Two important chrome hardening plants are already in operation in the United States under van der Horst licenses—those of the American Hammered Piston Ring Division of the Koppers Company, at Baltimore, Md., and the Naval Aircraft Plant at Philadelphia, Pa.

Illuminated "Lucite" Typewriter Roll

The necessity of working "blind" in cutting stencils is obviated by the use of a new typewriter roll of "Lucite" methyl methacrylate, a du Pont plastic, which transmits light received from a six watt fluorescent tube in the special lighting fixture shown, illuminating the stencil

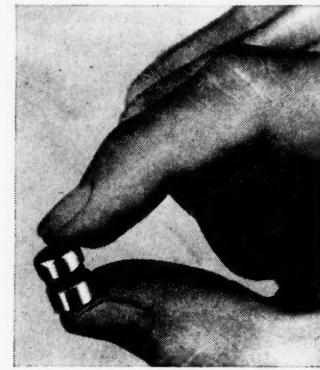


Cutting Stencils on a Lucite Illuminated Typewriter Roller

from beneath. Thus each letter, as cut, becomes easily visible. The roller is claimed to last at least for the life of the machine, maintaining its original smooth surface, as the typewriter keys do not indent the plastic. It also makes possible the typing of a greater number of legible carbon copies. The roller and light, as illustrated, are from the Lumirrol Company, New York City.

New Low-Price All-Metal Mercury Switches

Durakool, Inc., 1010 N. Main Street, Elkhart, Ind. announces a new low-price all-metal Mercury Switch which they call the "Tipit" Switch. The "Tiny Tipit" which is illustrated above has a capacity of $\frac{1}{2}$ ampere at 24 volts to 4 amperes at 6 volts. It is used by automobile manufacturers as a convenience switch to turn rear trunk light on when the lid is lifted, and off when the lid is lowered. Other uses are for under-the-hood illumination, glove compartment lighting or the field of advertising displays and even toys and novelties where their exceedingly low price permits their use in these fields



"Tiny Tipit" Mercury Switch

hitherto closed to mercury switch contacting—wherever infrequent operation of a low-watt circuit is desired. Also ideal for use in explosive atmospheres and on electrical machinery.

The Tipit Switch mounts in a small holder with screw stakes for terminal connection. This assembly is attached to door, lid, or other movable member; the movement actuating the switch. Tipit operates on a tilt of 20 degrees or more. Durable and dependable, Tipit lasts indefinitely on stipulated loads. Durakool invites your inquiry.

International Harvester Announces New Truck Models

Users of light-delivery and light-duty trucks ranging in capacities from $\frac{1}{2}$ to $1\frac{1}{2}$ tons will be interested in the recent announcement of International Harvester's new line of five models in that capacity range. The new models are: the $\frac{1}{2}$ -ton Model K-1, $\frac{3}{4}$ -ton Model K-2, 1-ton Model K-3, $1\frac{1}{4}$ -ton Model K-4, and the $1\frac{1}{2}$ -ton Model K-5. Wheelbases range from 113 to 177 inches and gross vehicle weight ratings from 4,400 to 13,500 pounds. Among many important features of the new Internationals, an outstanding one is the new "Green Diamond" engine which, in three sizes, powers the five models. It is declared that exhaustive research and extensive and far-reaching tests have proved the ability of these engines to provide more power with improved performance and remarkably greater fuel economy. The International line of trucks is manufactured by International Harvester Company, Inc., Chicago.

★ For Defense!

**FORTS, TOO, NEED A
TROUBLE-FREE
WATER SUPPLY—**



YOU, who have already chosen Sterling Deep Well Pumps, will be happy to see this photograph of the first of four Sterlings being tested prior to permanent installation at Fort Benjamin Harrison.

YOU, who use Sterling Pumps, know that Sterlings destined for the U. S. Army passed the rigorous tests with "flying colors."

You will also be pleased to know that while Sterling Deep Well Pumps are being supplied for use by the Army, recent expansion plans have been completed that enable Sterling to take care of normal orders for pumps and service from private industry.

If you have water handling problems—write us today.

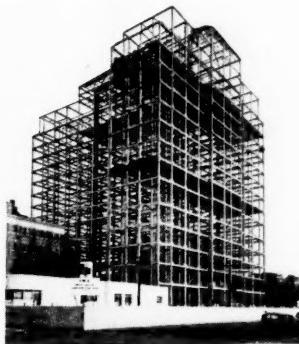
PRECISION BUILT
STERLING
DEEP WELL TURBINE PUMPS

STERLING PUMP CORPORATION
Hamilton, O. Stockton, Calif.

WRITE FOR CATALOG TODAY!

MARCH NINETEEN FORTY-ONE

DESIGNERS ENGINEERS



Fabricators of
**STRUCTURAL STEEL BUILDINGS
BRIDGES—TANKS—BARGES
PASSENGER and CARGO VESSELS**

—Five Plants—

The Ingalls Iron Works Co.

Birmingham, New York (1 E. 42nd St.), Atlanta, Pittsburgh
and New Orleans

Address: Birmingham, Alabama

YORK SAFE & LOCK CO.

Manufacturers of

**OUT-OF-SIGHT DOOR SAFES
A AND B LABEL SAFES
TWO HOUR CERTIFIED SAFES
ONE HOUR SAFES
WALL SAFES
FIRE RESISTIVE VAULT DOORS
BURGLARY RESISTIVE CHESTS
BANK AND SAFE DEPOSIT VAULT DOORS
SECURITY LOCKERS, SAFE DEPOSIT BOXES
BANK VAULT EQUIPMENT**

Factory and Principal Office

YORK, PENNA.

Baltimore Branch—7 W. Redwood St.
Washington Branch—1331 Connecticut Ave.

Branches in All Principal Cities

Manufacturers and Builders of the World's Greatest Vaults



Joe Czajkowski *discovers something*

One look at Joe's uneventful, flat face and you think of an old dishpan.

\$\$\$ But he's a darn smart salesman. Knows when some big-shot he's calling on can be closed, and how to close him. And he's quick to see the angles that help matters along.

\$\$\$ "Wherever I go," Joe says, "I notice publications we advertise in, lying around reception rooms.

\$\$\$ "But there's one I never see in reception rooms. It's the *best one* because I see it inside, right on my customer's desk. That's where it does me the most good.

\$\$\$ It's in head offices all over. In Chicago, Detroit, Toledo, Cleveland, Pittsburgh."

\$\$\$ If your own advertising is aimed at executives, you too need **The Wall Street Journal**, Joe's No. 1 selling aid.

\$\$\$ 81.3% of its national circulation is in the 181 counties where 74% of all U. S. manufacturing is done.

\$\$\$ Gives you more readers, per advertising dollar, among active management-executives of industrial corporations with assets of over \$1,000,000 than any other publication. More readers, per dollar, among bank presidents than any other publication.

\$\$\$ And 86% of its subscribers read it in their offices at their desks—*their point of purchase and your point of sale*.

WALL STREET JOURNAL
...sells management executives
...at point of sale

MANUFACTURERS RECORD FOR

New Methods and Equipment

Clark Power Shovel

Claimed to reduce the cost of handling loose materials and to have important applications in foundries, chemical, fertilizer and similar plants, a new material



Clark Power Shovel for Handling Loose Material

handling machine called the Clark Power Shovel has been introduced by Clark Tractor Division of Clark Equipment Company, Battle Creek, Mich. The machine is built on a three-wheeled chassis, rear wheel steer, and is powered with a 4-cylinder Continental Motor. It is capable of 24-hour continuous operation and every part has ample dust protection. The heavy steel scoop picks its load of loose or semi-hard material from the pile without ramming it. Carrying a load of 1500 pounds, the machine hauls as much as 18 cubic feet, at from 3 to 11 miles per hour, elevates it in less than 10 seconds, and dumps it into carts, trucks or bins. One model has 45 inches underclearance when dumped, and another 65 inches. The driver controls all operations without dismounting. The shovel is approved by the Factory Mutuals and the Underwriters as to fire hazard. Standard equipment includes self-starter, and generator and battery, while special equipment includes lights and a hopper lid that opens and closes automatically as the driver picks up and dumps the load.

Automatic Blankets

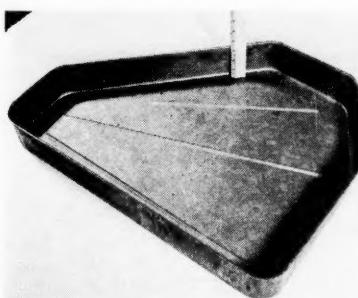
The automatic blanket, subject of limited production and sales by General Electric Company in the last four years, has undergone improvements based on studies of performance in several thousand homes throughout the country and is now being marketed as a single standardized product, available in five different colors. New factory facilities for the automatic blanket have been established in Bridgeport, Conn., and results of the current season's test sales efforts have been so outstanding that General Electric's Pioneer Products Section is already drawing analogies between the electric blanket and the electric refrigerator in terms of man's efforts to solve the problem of comfortable living. A restricted number of test sales are being promoted

this season, according to David C. Spencer, Jr., manager of the Pioneer Products Section. R. J. Cochran, manager of automatic blanket sales, has chosen Texas as one of the test areas, and merchandise activities have been undertaken by department stores in Dallas, Houston and other Texas cities.

The blanket is a deeply-napped, soft and buoyant, light weight covering especially woven of the finest selected wool and cotton with inherently greater warmth insulating qualities than many fine ordinary blankets. It weights only five pounds. Heating wires of standard copper especially insulated are secured in individual channels between the double warp of the blanket. The wire forms a heating element 54 by 74 inches in size, producing an even warmth throughout the bed. The overall size of the blanket is 72 by 86 inches, slightly longer than standard blankets. It is available in blue, green, cedar, gold, and there is one reversible blanket of winter rose and sahara. A special transformer may be suspended beneath the bed by a handle to reduce the regular 110-120 volt house current to only 10 volts. It operates on alternating current. A control box about the size of a package of cigarettes makes it possible to dial a comfortable night's sleep, regardless of outside temperature changes.

Fuel Reservoir Made of Armco Zincgrip Paintgrip Sheets

As an example of the use of a special sheet metal developed for (1) a severe forming without peeling or flaking of the zinc coating, and (2) for a bonderized mill treatment of the zinc-coated sheet



Refrigerator Tray Made of Armco Zincgrip Paintgrip Sheets

metal to provide a neutral surface for immediate painting, an accompanying illustration shows a fuel reservoir fabricated by the Chattanooga Stamping and Enameling Company for use in refrigerators. The high grade zinc coating of the 20-gage ARMCO ZINCGRIP PAINTGRIP sheets easily withstands the severe forming operation without peeling or flaking, while a special bonderized finish, united with the zinc coating in the steel mill, provides an excellent neutral surface for paint. Only a soapy water solution is needed to prepare the sheets for the dies, in contrast with the graphite and oil lubrication required before these sheets were adopted. The soapy water solution prevents scratching of the dies and breakage of sheets and is easily removed afterward. The reservoir pans are 26½ inches long, 19½ inches wide at the widest point, and 3½ inches deep.

Research Stages Come-Back for Leather Belting

During the period of America's greatest industrial expansion when the country progressed from practically an agricultural country to an industrial giant that amazed the rest of the world, the wheels of industry were driven by leather belts, according to the American Leather Belting Association, New York. Leather belting still continues to lead in the number of belts installed and horsepower transmitted, it is declared, and this will probably always be the case if belting is bought on an efficiency or production basis, because of its driving power for energy consumed.

Unfortunately, manufacturers of leather belting, it seems, were so satisfied with the efficiency of their product that they not only neglected to carry on research to still further improve it, but chose to ignore advertising and sales efforts put up by competition. Large sums, on the other hand, were expended by those advocating the direct motor drive, group drive, V-belt drive, etc., with the result that serious inroads were made into leather belt sales as a whole. However, a number of progressive leather belt manufacturers not only continued to forge ahead in individual sales, but also inaugurated extensive laboratory research to determine not only how the coefficient of friction of leather belting might be improved, but also how to transmit the maximum horsepower at the lowest cost. This research resulted in what is now termed "The Productive Drive."

This drive consists of the highest quality short-center leather belt operating in connection with a pivoted motor base. Very little was said about its efficiency, pending a thorough try-out in those industries where it would be subjected to the severest test. Results have been so gratifying, it is said, that leather belt manufacturers believe that now is the time, with the new armament program getting under way, to tell what the new drive will do to get the utmost out of each machine. Accordingly, in connection with other advertising and publicity efforts, an elaborately illustrated book on the short-center belt and pivoted motor base is available for free distribution.

Industrial Fluorescent Lighting Fixture

In view of the widespread interest in fluorescent lighting for industrial plants, an announcement by Mitchell Manufacturing Company, Chicago, of a new fixture especially designed for large-area, high intensity lighting, will prove interesting.



According to the manufacturer the new fixture is being installed in new defense plants.

It bears the Fleur-O-Lier, Underwriters' and Mitchell guarantees, and employs two of the new 100-watt T-17 fluorescent bulbs which are said to be the largest so far produced. The bulb is 5' long, 2½" thick, with coolness, economy and effective soft illumination claimed for it. Information obtainable through electrical supply distributors.

INDUSTRIAL NEWS

John W. Stang Corporation

The John W. Stang Corporation has opened offices at 2 Broadway, New York, N. Y. This company sells and rents wellpoint systems and pumps, utilizing patented equipment especially designed to bring new economy to this field. John W. Stang, president of the company, has been connected with this type of business for the past 25 years.

Westinghouse Makes Phillips Assistant to President

George H. Bucher, president of the Westinghouse Electric and Manufacturing Company, announces the appointment of T. J. Phillips as assistant to the president. Mr.

Phillips, formerly general works manager, will continue in charge of the headquarters manufacturing staff, the Small Motor, Lighting and Transformer Divisions, and the Construction Department of the company, with headquarters in Pittsburgh. He joined Westinghouse in 1915 and was appointed general works manager in 1935 to serve as central authority for all manufacturing operations of the company.

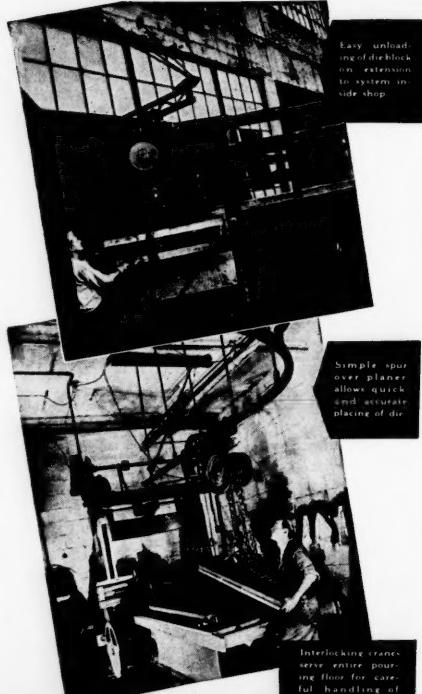
Superior Electric Machinery and Philadelphia Transformer Companies Merge

Effective as of January 1, the business formerly conducted by the Superior Electric

Simple Methods for stepping up DEFENSE PRODUCTION

With a surging demand for greater output, plants operating on defense materiel use every possible means to obtain it. It is no wonder that these plants are rapidly installing overhead handling equipment to relieve floor congestion — to gain time through process aids — or to conserve skilled manpower by eliminating handling fatigue.

Simple systems as shown here are quickly and inexpensively applied wherever a short cut is needed. American Monorail engineers can spot these places in a short survey of your plant. They will then offer a detailed proposal which does not obligate you in any way. Why not give them a chance to help push along your defense production?



THE AMERICAN MONORAIL COMPANY

13120 Athens Ave. Cleveland, Ohio

Machinery Company has been combined with the Philadelphia Transformer Company, 2829 Cedar Street, Philadelphia, Pa., and the latter has assumed all liabilities, assets, contracts, plant, goodwill, etc. The companies will continue to be owned and operated by the same management as in the past, which will result, it is believed, in an increase of plant facilities and better enable the company to handle orders more promptly and efficiently. Products include motors, meters, turbines, generators, and other power equipment.

B. F. Goodrich Company Changes

Changes in the sales staff of the mechanical division of The B. F. Goodrich Company, Akron, Ohio, as announced by W. S. Richardson, division general sales manager, include the following: A. W. Doran has been assigned to special duties in connection with railroad and governmental sales; B. E. Silver, sales representative of the mechanical division in Indiana, is transferred to government sales in Washington, D. C. and W. E. Nees has been appointed to his post with headquarters in Indianapolis. Ralph Barcus of the Akron district staff succeeds Mr. Nees in the West Virginia territory, with headquarters in Charleston.

Walker Electrical Company to Employ 200 People

The Walker Electrical Company, electrical specialty manufacturers of Atlanta, which recently moved to its new plant and office building, 634 Anton Street, says that operations will require 45,000 square feet of floor space, with 200 employees, and an investment of well over \$100,000.

In its service to the electrical industry over a number of years this company has established an enviable reputation.

Koppers Consolidates New York Divisions and Affiliate

Koppers Company, Pittsburgh, Pa., announces the consolidation of New York City headquarters for three Koppers Company divisions and an affiliated company at 60 East Forty-second Street. Koppers Company Tar and Chemical Division is establishing New York headquarters for the first time, while the Wood Preserving and Gas and Coke Divisions and the Koppers Coal Company, a Koppers Company affiliate, are moving from 90 Broad Street.

Israel Leaves Southern Pine Association

Albert R. Israel, for many years publicity director of the Southern Pine Association, New Orleans, La., has resigned that position, effective February 1, and will engage in business, according to Secretary-Manager H. C. Berckes, who states that arrangements have been made to handle the work previously done by Mr. Israel. With a wide background of newspaper work, Mr. Israel has formed a partnership with Claude H. Smith of New Orleans, long identified with the oil business of Louisiana, to conduct the Petroleum Service Bureau which they have established to supply factual information of all kinds concerning Louisiana oil lands, oil properties, etc.

Missouri Pacific Orders to Whitcomb

Orders recently placed by the Missouri Pacific Lines for new equipment, at a cost of \$4,388,000, included one to Whitcomb Locomotive Company, Rochelle, Ill. (main office Philadelphia, Pa.) for three 360-horsepower Diesel-electric switch engines.

CertainTeed Takes Over Gypsteel Gypsum Plank

H. J. Hartley, President, CertainTeed Products Corporation, New York, N. Y., announces the purchase by his company of the Gypsteel Gypsum Plank business of American Cyanamid and Chemical Corporation, and will take over the machinery and equipment now in use at Cyanamid's Linden, New Jersey, plant. At CertainTeed's various plants, it is contemplated that Gypsteel Plank will be in production in March. In the meantime, the American Cyanamid and Chemical Corporation will continue to supply the trade with this product. The Linden plant is not involved in the sale and will be available for the manufacture of chemicals. Mr. Hartley states that the Gypsteel Plank line of fire-resistant floor and roof construction further rounds out CertainTeed's list of building products, consisting of gypsum wallboards and lath, gypsum plasters, asphalt roofing, shingles, and siding, insulation board and fibre wallboards.

(Continued on page 54)

The Arundel Corporation

BALTIMORE, MD.

Dredging—Construction—Engineering

Distributors of Sand - Gravel - Stone and Commercial Slag

A COMPLETE ORGANIZATION

Our complete organization with years of experience in successfully executing large construction contracts of various kinds is prepared to undertake the construction of earth, masonry and concrete dams, drydocks, dredging of all kinds, river and harbor improvements, deepening channels, hydraulic filling and rock work, tunnels, railroad construction, sewers and waterways.

PERSONNEL:

JOSEPH V. HOGAN, President
RICHARD A. FROEHLINGER, Executive
Vice-Pres. & Treas.
W. BLADEN LOWNDES, Vice-President
JOSEPH N. SEIFERT, Secretary & Asst. Treas.
E. L. WADE, Assistant Secretary
T. K. SHAUGHNESS, Assistant Secretary

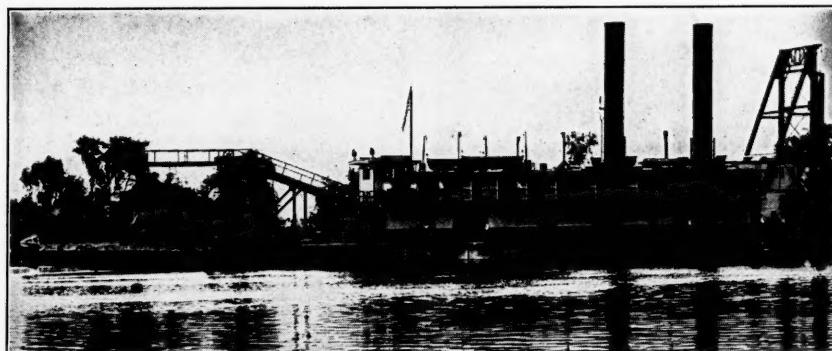
C. WARREN BLACK, Vice-President in Charge of Engineering and Construction
JOSEPH G. KUHN, Vice-President in Charge of Dredging
GEORGE H. BACOT, Vice-President in Charge of Materials' Production
JOHN A. REILLY, Vice-President in Charge of New York & New England Areas.

**MAIN OFFICE: Arundel Building, Pier 2, Pratt Street
BALTIMORE, MD.**

Branches: BROOKLYN, N. Y.—MIAMI, FLA.

DREDGING

**FILLING, LAND RECLAMATION, CANALS, PORT WORKS
RIVER AND HARBOR IMPROVEMENTS—DEEP WATERWAYS AND SHIP CHANNELS**



**We are especially equipped to execute all kinds of dredging,
reclamation and port works in Southern waters.**

Correspondence invited from corporate and private interests everywhere.

Contractors to the Federal Government

ATLANTIC GULF AND PACIFIC CO.
NEW YORK: 15 Park Row HOUSTON, TEXAS: Scanlan Building

INDUSTRIAL NEWS

(Continued from page 52)

Koppers Promotions and Appointments

Two promotions in the Engineering and Construction Division of Koppers Company, Pittsburgh, Pa., are announced by Joseph Becker, vice president of Koppers Company and general manager of that division. G. M. Carylin has been appointed assistant vice president and W. L. Gable has been named sales manager for the division, the appointments effective February 17. Both Mr. Carylin and Mr. Gable were sales engineers. The former is a graduate of the University of Illinois and joined Koppers in 1925, while Mr. Gable graduated from Cornell University in 1909 and went to Koppers in 1916.

W. F. Munnikhuysen has been elected vice president of Koppers Company and general manager of the Wood Preserving Division. He formerly was president of The Wood Preserving Corporation, a Koppers subsidiary, which recently became a division of Koppers Company. H. R. Condon and E. J. McGhee, formerly vice presidents of The Wood Preserving Corporation, have been made vice presidents of Wood Preserving Division. All these officers will be located in the Pittsburgh general office of Koppers. D. C. Jones, Chicago, Ill.; R. P. Jackson, Texarkana, Tex., and E. S. Park, Nashua, N. H., are district vice presidents in their respective territories. All sales, plant and production department personnel of the Wood Preserving Division of Koppers Company, operating in 26 states, will continue activities of the predecessor company, The Wood Preserving Corporation.

Percy Jenkins Joins Roebling Company

John A. Roebling's Sons Company, Trenton, N. J., announces the appointment of Percy Jenkins as manager of the Boston branch. A graduate of Harvard University in the class of 1924, Mr. Jenkins joined the Wickwire Spencer Steel Company and was associated with that organization for more than 15 years. He spent three years in the Wickwire Spencer mills at Worcester, Massachusetts, and four years in the company's

Sales Department in New York City, concentrating on mechanical specialties. After serving as Assistant Manager of Sales, Eastern District, and then Manager of the Eastern District, he served from 1934 until December, 1940, as Manager of Sales, New England District, for Wickwire. He began his connection with the Roebling Company on January 6, 1941, and will be located at 51 Sleeper Street, Boston, Mass.

TRADE LITERATURE

GEARS, SPROCKETS, CHAINS, ETC.—

Catalogue (1941)—devoted to stock gears, sprockets and chains, reducers, bearings and couplings, with full specifications and prices of pinion rod, racks, ratchets, internal gears, special gears, spiral and helical gears, worm gears, bevel and miter gears and other products; publication also presents information regarding special services rendered, and has attached a supplement listing types of equipment the company has available for special work.

Atlantic Gear Works, New York, N. Y.

ALUMINUM LADDERS—

Catalog—44 pages, illustrating and describing many types of aluminum ladders for fire fighting, industrial and commercial uses, with data on aluminum gangways, stages, scaffolding, conveyors and special aluminum ladders.

Aluminum Ladder Company, Tarentum, Pa.

SILENT CHAIN DRIVES—

Folder No. 1894—Illustrated, devoted to 3/16-inch pitch Silverstreak silent chain drives for fractional horsepower duty.

Link-Belt Company, Chicago, Ill.

CAB CARRIER—

Folder—Illustrating and describing the Cleveland Tramrail Raise-Lower Cab Carrier and some of its applications.

Cleveland Tramrail Division of The Cleveland Crane & Engineering Company, Wickliffe, Ohio.

CHARLESTON'S ADVANTAGES—

Folder—Illustrated, devoted to the industrial advantages of Charleston, S. C.

Charleston Industrial Bureau, Charleston, S. C.

SLIDING GRILLES—

Catalog—illustrating and describing Cornell Sliding Grilles, with specifications and information on hanging.

Cornell Iron Works, Inc., Long Island City, N. Y.

PUMPING EQUIPMENT—

Industrial Catalog—being distributed to users of pumping equipment for power plant, industrial process work and general applications in manufacturing plants of all types; in sectionalized form, the publication contains bulletins on various types of pumps, including centrifugal, reciprocating and rotary pumps, stump pumps, condensate return units and miscellaneous units.

Goulds Pumps, Seneca Falls, N. Y.

NORTON CUT-OFF WHEELS—

Folder—covering the use of Norton cut-off wheels on Delta equipment.

Norton Company, Worcester, Mass.

WAGNER FANS—

Bulletin FU-41—illustrating and describing the complete line of Wagner cooling and ventilating equipment for 1941; publication contains 20 pages, presenting installation and application data that make it especially helpful to dealers and contractors using it as a sales manual.

Wagner Electric Corporation, St. Louis, Mo.

ROTATING LEAF PRESSURE FILTERS—

Bulletin F-102—illustrating and describing the Swenson Rotating-Leaf Pressure Filter, a high-efficiency filter claimed to produce perfectly clear filtrates.

Swenson Evaporator Company, Division of Whiting Corporation, Harvey, Ill.

SPARKS—

Folder—a treatise on sparks as generated by grinding wheels, characteristics and possible information they may impart; publication presents a chart on sparks which is interesting and informative.

Norton Company, Worcester, Mass.

C-E DIRECT FIRED SYSTEMS—

Catalog—38 pages, incorporating latest improvements in mills and burners as well as many of the latest installation drawings of steam generating units covering a wide range of capacity and pressure; publication contains 50 illustrations.

Combustion Engineering Company, Inc., New York, N. Y.

PLANT SITES in the Seaboard Southeast

In the six southeastern states served by the Seaboard Air Line Railway there are many excellent plant locations suitable for a wide variety of enterprises.

Assets of prime importance include an abundance of raw materials, cheap power, good labor conditions, excellent transportation facilities, quick access to markets, and last but not least, a friendly people who are sympathetic towards industry and its problems.

Detailed reports will be furnished on specific sites upon request. To interested prospects we offer all the benefits of an experienced plant location service without obligation or cost.

WARREN T. WHITE, GENERAL INDUSTRIAL AGENT
SEABOARD AIR LINE RAILWAY, NORFOLK, VA.

Industrial Department
SEABOARD
AIR LINE RAILWAY

We have helped

many businesses that have brought us their financial problems.

Correspondence invited.

BALTIMORE COMMERCIAL BANK

Gwynn Crowther, President

BALTIMORE, MARYLAND

Member Federal Reserve System

Member Federal Deposit Insurance Corporation

While cosmopolitan in its general appeal, and modern up to this moment in its equipment, there is a peculiar flavor of The Old South here which Southerners are quick to note and appreciate. They feel at home and come back to us again and again.

Rates \$3.00 per day and up. Every room with bath or shower. Centrally located.

The Southern Hotel

THE GREAT SOUTHWEST

If you contemplate a change of location or the establishment of a branch plant or warehouse let us tell you of the advantages of a location on the Northeast Oklahoma Railroad in northeast Oklahoma and southeast Kansas.

Low power rates

Ample water supply

Excellent labor conditions

Good living conditions

We have five trunk line connections reaching the entire southwest.

Address: H. B. Cobban, President

Northeast Oklahoma Railroad
Miami, Oklahoma

NATURAL GAS

A fuel whose value has been proven by years of use in a most diversified line of industrial applications.

Natural gas has created the possibility of effortless comfort by the facility, and economy with which it fits into the home.

SOUTHERN NATURAL GAS COMPANY

Watts Building.

Birmingham, Ala.



Nation's First Completed Air Base Is Dedicated at Savannah

THE Savannah Air Base, first project of its type completed in the United States under the new defense program, was formally dedicated February 19.

Ninety days after ground was broken on October 4, the \$3,000,000 base was ready for occupancy by 3,500 officers and men.

Major General Barton K. Yount, commanding officer of the Southeastern air district, who was principal speaker at the dedication, stated "For the past year and a half, we have been engaged in a tremendous expansion of the Army Air Corps. I am happy to report that, in spite of tremendous difficulties, this expansion is progressing practically on schedule, and within a period of a few months the United States will possess an air force which will be capable of meeting our national requirements, whatever they may be."

"One of the most important of the many things which have required development has been the selection and construction of our new air bases. . . . The development of aviation and naval weapons has reduced the effectiveness of

BY
James H. Cobb, Jr.

barriers to hostile operations from abroad, and if we are so unfortunate as to have to engage in another war, an air attack against our seaports and industrial centers is a distinct and disturbing possibility. An indispensable element of defense against such attacks is an efficient air force. . . ."

Mayor Thomas Gamble of Savannah told how the city had surrendered the greater part of the municipal airport to the Army, with the prospect of transferring the entire field upon completion of a new commercial airport for Savannah.

The buildings, all frame except two massive steel hangars, are built on concrete foundations, with termite shields.

Barracks have forced hot air heating systems, with filters, and modern plumbing in each building.

Central steam heating is provided for the 14 buildings in the hospital area.

The original project included 182 buildings—55 barracks for 3,500 men, 18 dining halls, 20 warehouses, 14 administration buildings, 150-bed hospital, fire headquarters, officers' quarters, and various other buildings.

A well, with a 100,000-gallon water tank, a sewage disposal plant, paved streets and sidewalks (emulsified asphalt), railroad spur, concrete parking apron 200 by 2,000 feet, and other items also were built in the first 90 days.

On Feb. 1 additional work at the airport, including a \$500,000 supplementary project for new barracks and \$240,000 for extension of existing runways, was transferred from the Quartermaster Corps to the U. S. District Engineer Department at Savannah, under Col. F. W. Altstaetter.

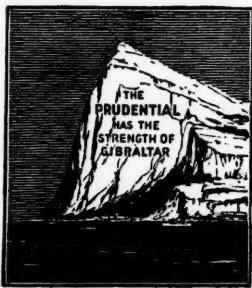
The project was handled by private contract with Goode Construction Corporation of Charlotte, N. C., on a fixed fee basis. Espy Paving & Construction Company of Savannah was sub-contractor for the paving and utilities.

Burge & Stevens of Atlanta served as architect-engineer, with James R. Wilkinson as associate architect.

"FAMILY INCOME"

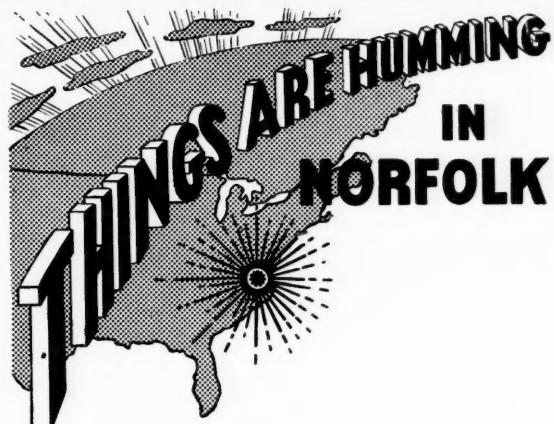
Our policy with this title provides a widowed mother with monthly checks while her children are growing, and then a lump sum or income.

May we quote some figures?



The Prudential
Insurance Company of America
Home Office, NEWARK, N.J.

MARCH NINETEEN FORTY-ONE



HERE is a story in which every alert business man will be instantly interested . . . for it's about the brightest spot on the nation's business map, today . . . Norfolk.

In one year population jumped from 144,332 to 165,000. Navy Yard employees increased to nearly 17,000. The total Navy payroll for all civilian employees, including the Naval Base, is in excess of \$50,000,000 . . . 17 billion dollars have been allocated for national defense; one billion and a half of it will be spent in the Norfolk area on warships, air fields, piers, improvements, etc.

Ledger-Dispatch and Virginian-Pilot now have combined circulation in excess of 100,000. Hotels are crowded and new families are moving in at the rate of 200 a month; ground has been broken for new theatres; new home building projects amounting to more than \$5,000,000 under way; another bus terminal to accommodate 900,000 passengers a year to be constructed and railroads will spend \$1,000,000 on additional facilities. All this and more, plus increased cultural and recreational activities and new municipal azalea gardens, with 5,000 plants already under cultivation.

*This is only part of the story.
Write for further details—Dept. MR.*

NORFOLK ADVERTISING BOARD
NORFOLK
VIRGINIA

National Defense Program Awards in the South

(Continued from page 40)

Emergency Ship Program	Bethlehem-Fairfield Shipyard, Inc., Baltimore	Thirteen ways and other shipbuilding facilities, est. cost (plant facilities will be installed at cost)	7,838,000
MISSISSIPPI			
Qtmtr. Corps	Reliance Manufacturing Co., Columbia	75,000 khaki cotton (percale) shirts	64,374
" "	N. & W. Overall Co., Inc., Jackson	24,000 working suits	24,420
" "	Irwin B. Schwabe Co., Inc., New Albany	100,000 jean khaki cotton shirts	48,379
MISSOURI			
Qtmtr. Corps	Rice Stix Dry Goods Co., Farmington and St. Louis ..	156,216 khaki cotton shirts	151,254
Qtmtr. Corps	H. D. Lee Mercantile Co., Kansas City	15,000 khaki cotton shirts	30,000
Air Corps	Standard Steel Works, North Kansas City	Trailers and dollies	941,554
Qtmtr. Corps	Baker-Lockwood Mfg. Co., Kansas City	2,000 pyramidal tents	28,360
" "	Cowden Mfg. Co., Kansas City	20,340 khaki cotton shirts	36,908
Defense Plant Corp.	Curtiss-Wright Corp., St. Louis	Build and equip plant and buy machinery for manufacture of airplanes	13,471,150
Qtmtr. Corps	International Hat Co., St. Louis	40,000 cloth covered fibre helmets	49,784
" "	Oberman & Co., Jefferson City	335,000 khaki cotton trousers	226,661
Medical Corps	Buck X-Ograph Co., St. Louis	Intensifying screen & X-ray material	39,727
Corps of Engrs.	Fruehauff Trailer Co., Kansas City	Trailers	4,465,040
Qtmtr. Corps	A. P. Martin Mfg. Co., Tipton	50,000 cotton khaki trousers	34,483
" "	Brown Shoe Co., Inc., St. Louis	30,000 legging top leather boots	204,300
Supplies & Accts.	International Shoe Co., St. Louis	50,000 legging top leather boots	324,000
" "	C. Hager & Sons Hinge Mfg. Co., St. Louis	Marine butt hinges, hasps & brass strap	88,774
" "	Mallinckrodt Chemical Works, St. Louis	Mercuric oxide	86,100
NORTH CAROLINA			
Corps of Engrs.	Southern Engineering Co., Charlotte	Steel hangars	43,819
Medical Corps	Barnhardt Mfg. Co., Charlotte	Surgical dressings	76,277
Emergency Ship Program	North Carolina Shipbuilding Co., Wilmington	Six ways, estimated cost	5,140,000
OKLAHOMA			
Corps of Engrs.	J. B. Klein Iron Foundry Co., Oklahoma City	Steel hangars	47,743
" "	Capital Steel & Iron Co., Oklahoma City	Hangar doors	154,585
TENNESSEE			
Qtmtr. Corps	The H. K. Ferguson Co., Cleveland, Ohio and the Oman Construction Co., Nashville. (Architect & Engineer: The H. K. Ferguson Co., Cleveland, Ohio)	For construction of ammunition loading plant known as Wolf Creek Ordnance Plant, at Milan, Tennessee, to be operated by Procter & Gamble Defense Corporation of Cincinnati, Ohio on cost-plus-fixed basis	8,514,370
Qtmtr. Corps	O'Bryan Bros., Inc., Nashville	70,000 khaki jean cotton shirts	30,800
TEXAS			
Qtmtr. Corps	Wm. L. Barrell Co., Inc., N. Y. C., Agent for Corsicana Cotton Mills, Corsicana	1,030,000 khaki cotton duck	252,999
" "	Texas Trunk Co., Inc., San Antonio	20,000 trunk lockers	54,500
Corps of Engrs.	Padgett Bros. Co., Dallas	20,000 trunk lockers	54,400
Qtmtr. Corps	Mosher Steel Co., Houston	Steel hangars	103,199
" "	Crawford-Austin Mfg. Co., Waco	500,000 yds. khaki cotton duck	127,250
Defense Plant Corp.	Williamson-Dickie Mfg. Co., Fort Worth	18,320 khaki cotton shirts	31,182
	North American Aviation, Inc., Dallas	Build, equip and buy machinery for airplane plant	7,700,000
VIRGINIA			
Air Corps	Crawford Manufacturing Co., Inc., Richmond	Airplane paulin	107,501
Ordnance	Miller Mfg. Co., Inc., Richmond	Tool chest and packing boxes	22,598
Supplies & Accts.	Tidewater Supply Co., Inc., Norfolk	Turret lathes	32,402
Qtmtr. Corps	Ford Motor Co., Alexandria	Light cars	312,600
Corps of Engrs.	Natural Asphalt Co. of Virginia, Richmond	Distributors	28,980
Qtmtr. Corps	Riverside & Dan River Cotton Mills, Danville	96,880 bleached cotton sheets	84,236
WEST VIRGINIA			
Qtmtr. Corps	Marietta Mfg. Co., Point Pleasant	All steel, steam, twin screw, riveted and welded army mine planters: one set of Van Dyke negatives; and one set of booklet plans	8,241,750
Qtmtr. Corps	J. L. Stifel & Sons, Wheeling	100,000 yds. wind-resistant cotton cloth	49,740
Ordnance	International Nickel Co., Inc., Huntington	Nickel alloy	42,238
Supplies & Accts.	Evans Lead Corporation, Charleston	Dry red lead	21,336
Ordnance	General Machinery Ordnance Corporation, Charleston	For rehabilitation and equipment of U. S. Naval Ordnance plant, South Charleston, without profit or fee and to be leased to contractor by the Federal Government for the machining of ordnance equipment at an estimated cost not to exceed ...	1,645,000

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Plastics from Bagasse

(Continued from page 25)

acteristics and with resistance to moisture absorption similar to those of phenol-formaldehyde and phenol-furfural molding compounds. The relatively low cost of molding powders produced from bagasse and other agricultural residues should be of considerable interest to the automotive, rubber, electrical, furniture and building industries where large volume production is practiced.

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Rubber, Natural & Synthetic

(Continued from page 27)

not mixtures of separate polymers of the two ingredients. The polymer chains are made up of units of the two simple molecules chemically united.

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high speed elevator. The first is a power control system that eliminates the jolting stop on the end of a swooping "power dive". No doubt, many stomachs are grateful for this development.

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• A third important development in this field by our company is the so-called "Safe-T-Ray", the photo-electric cell which prevents electric doors from closing until the threshold has been cleared of passengers.

• If you have ever ridden on the elevators we made and installed in the RCA Building, New York, you can fully appreciate the comfort, speed and safety of a modern elevator system. In these elevators you have practically no sensation of movement, yet you travel at speeds up to 1400 feet a minute between stops and starts.

• In the field of vertical transportation the electric stairway is becoming increasingly important. By conservative estimate more than 30 million people rode on the electric stairways we installed at the New York World's Fair. The Westinghouse Electric Stairways in the Perisphere were the longest ever installed in this country.

• The elevator engineer is a man we ought to take off our hats to. For he has made the busiest of all transportation systems the safest as well. Elevators today have an unparalleled safety record. In fact, it is virtually impossible for a passenger to injure himself in a modern elevator.

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Fifty Years of Manufactured Abrasives

(Continued from page 21)

interchangeability of parts and better surfaces, for many operations modern grinding machines equipped with wheels made of manufactured abrasives are more economical for the removal of material than machine tools which use ordinary metal cutting tools. This is not true of all operations by any means, but it is true of a great many.

But machine tools such as millers, lathes, shapers, boring mills and the like—to say nothing of grinding machines—are themselves precision machines whose effectiveness depends upon the accuracy with which their parts are fashioned. You can get no more accuracy out of a machine than was built into it.

It has been said that there is not a single product of American industry into the manufacture of which manufactured abrasives do not enter. If a product is not ground or lapped for accuracy it is nearly certain to be buffed or polished for appearance. All of these operations employ abrasives.

Many non-metal products are processed to some extent with abrasives. For instance, paper is made from pulp—which is ground by large abrasive wheels. The pulp is made into paper on machines whose running parts and bearings are ac-

curately ground to shape and size. The paper is given a fine, shiny surface on calenders whose rolls are ground to a high degree of surface perfection. It is cut with knives sharpened to great keenness by grinding wheels. Finally, the paper is imprinted on presses whose great accuracy is due to grinding, and the ink is applied by rubber rolls which, also, are ground.

In making furniture and other products of wood, large quantities of abrasives are used. The woodworking machines' parts are ground to close tolerances. The knives and various other cutting tools are ground. Finally, fine finish is given by "sanding" either by machine or hand. The so-called "sand-paper" is of course no longer coated with rock sand but with modern abrasives.

The glass industry uses abrasives for cutting, edging and polishing both plate glass and table-ware. Lenses are given accurate shape and high finish required, by abrasives. The accuracy to which lenses for telescopes, microscopes, cameras and eye-glasses are ground is almost unbelievable.

In construction work, abrasives are used to smooth down concrete for the sake of appearance. Sometimes more than appearance is at stake. For instance, when heavy loads are to be carried, as on the abutments of a bridge, it is essential that the surface be true so that the load will be evenly distributed over the

whole surface. Thus the abutments of the Golden Gate Bridge were ground with grinding wheels in a specially designed grinding machine to an accuracy within one-thousandth of an inch per foot both lengthwise and crosswise.

Terrazzo floors are ground with abrasives. The beautiful marble, granite and stone work for exterior and interior of buildings are sawed, moulded, shaped and finished by grinding machines of various sorts. To make composition floors and sidewalks safe, abrasives are incorporated to prevent slipping.

It would be possible to go through the entire list of the thousands of products of all of the useful arts with which we are all familiar, and show ways in which modern abrasives enter into their manufacture either directly or indirectly.

The story of modern abrasives, those remarkable products of the electric furnace, would not be complete without reference to their uses as refractories in the world of high temperatures. It is rather astonishing to realize that one hand both "Carborundum" and "Aloxite" serve all industry as abrasives and on the other hand as refractories in many types of industrial furnaces where resistance to high heat, speed of heat transfer and resistance to softening and spalling are essential. As refractories, both of these materials serve industry in the form of refractory brick, tile, muffles, special and standard shapes and as refractory cements.

From this necessarily incomplete list of the uses to which the modern man-made abrasives are put, it is apparent that the minute crystals, almost overlooked by Dr. Acheson, have had a definitely important influence on the well-being of mankind.

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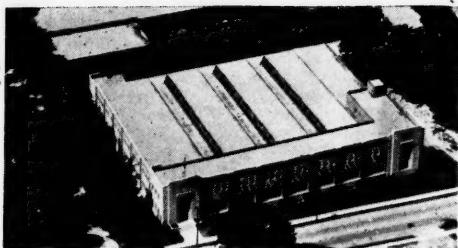
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PRECISION TRANSPORTATION

Government Regulation of Business

(Continued from page 28)

from the individuals who carry on the work. There is a legal fiction that a corporation is a person, and while this fiction has certain valuable uses in the solution of legal problems, it should always be kept in mind that it is merely a hypothesis and not really true. We tend to think of government as a personality, sometimes almost as a deity. Actually, of course, it is nothing of the kind. The government is not something apart from the people, all wise and all knowing. The government is made up of individual human beings who in childhood played the same kind of games, had the same dirty faces and torn clothes, went to the same schools, fought the same fights and loved the same loves, and in maturity eat the same kind of food, wear the same kind of clothes, go to the same movies, live in the same kind of houses, and all in all are just as smart, but no smarter, and just as dumb, but no dumber, than you and I.

If one takes a civil service examination and successfully names the capitals of the forty-eight states, the name of the longest river in the United States, writes a brief essay or a letter in a manner which indicates that he is not entirely illiterate, solves a few problems in long division, and otherwise indicates a fair degree of familiarity with some of the useful and some of the useless facts gleaned in a common school education, and after passing such an examination is placed upon the eligible list, and with passage of time receives a Governmental appointment, it is hard to understand why

and at what point that person becomes endowed with a superhuman ability to know the other man's business better than one who has given his life to the work. It never occurs to us to think of the postman in this fashion because we see him every day. If each of us could see and know all of the other human beings who carry on the multitudinous duties of Government, we would lose our sense of hero worship, finding that all have feet of clay.

Illusions are nice things to have. They are narcotics of the dream life which enable us to escape reality, but they should not color our daily lives nor cloud our sense of better judgment. You cannot hire a carpenter to lay a floor and expect to get a good job if you specify the size of his hammer, the type of nails and the number of strokes he must employ in striking each nail, not unless you are a better carpenter than he and you probably are not or you would not have hired him.

We the people cannot expect the various groups among us to do the best and the finest job, if we persist in designating other individuals not skilled in the particular type of work under consideration and giving such persons the authority to regulate the activities of the experts in the minutest details. We never think of doing that where physical skill is concerned, whether it be the electrician's pliers, the plumber's wrench, or the surgeon's scalpel. We must not forget that there are categories of mental skill equally difficult and equally important. If we cannot handcuff the manual worker and expect him to perform his task with skill and efficiency, we cannot hem in the brain of the mental worker with a steel band of regulation and expect him to per-

form his tasks with skill and efficiency.

What is true of individuals is true of groups. It would seem to be elementary that when we take a dollar from business in taxes and use that dollar to pay the salary of a Government employee whose duty is to regulate that business, and if the activities of that Government employee tend to further reduce the earnings of the business, both the dollar taken in taxes and the dollars which that business fails to earn by reason of regulation must be deducted from the total sum which that business can give to society in the form of reduced prices for its products, dividends for its shareholders and wages for its workers. Even though we may not be engaged in the particular business in question, we must inevitably be affected. First, because poverty is a spreading disease, and second, because the fate of our neighbor will inevitably become our own fate.

Will Durant, the philosopher, in an address before the National Association of Manufacturers, stated that we in America are now engaged in beating a retreat from liberty to discipline. That trend which we are now discerning in America is worldwide in scope and much farther advanced in Europe than here. In much of Europe liberty is today non-existent. Call it what you will, discipline or regimentation, something else has taken its place. In America liberty as a reality has been ebbing for a half a century. The decline of liberty has been in exact proportion to the increase in the size and power of Government.

One of the aims of regulation is to improve the lot of the individual, to give him social and material gains which make for a richer, fuller, happier life.

(Continued on page 64)

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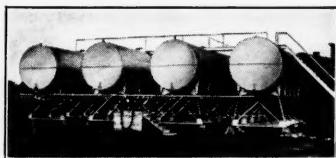
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Government Regulation of Business

(Continued from page 62)

However, intemperance in regulation is no different from intemperance in alcohol, food or any other physiological or mental activity. Intemperance always defeats the purpose gained by an otherwise useful activity. Regulation has done many things to our industrial structure. Over-regulation has cramped and hurt it in many places.

Mr. Knudsen has made a plea for the abolition of the Friday to Monday black-out in industry, which in his judgment is made necessary by the inability of our present facilities to meet the demands of the defense program. In a day when we think of social gains as important, when we think of reducing the necessary hours of labor as a goal worthy of attainment, there is strange disharmony in calling the week-end holiday a blackout. However, intemperance in regulation has left its mark on many industries, stripped them of the incentive for planning expansion and the training of new workers and left us poor in the machine tool industry and in the heavy industries, unable to cope with an emergency. We surrendered our liberties to the pagan god of regulation, exchanging our birthright for a mess of pottage. The law of compensation is as effective in human relations as it is in the physical world. You cannot make something out of nothing, you cannot get without giving, you cannot deprive your neighbor of his liberty by regulation without as inevitably surrendering your own liberty. We set out as a people to deal crushing blows to American busi-

ness, forgetting that American business is our business. In our eager selfishness to better ourselves or our own group or class, we forget the words of Lincoln that a house divided against itself cannot stand. As we look ahead into the immediate future, we see ourselves beginning to pay the price of our own cupidity. Any one who asserts that a complex civilization such as ours can be maintained and kept in balance with the type of Government regulation which was effective for a pioneer society fails to realize how utterly dependent he is upon his fellows. You have no way of knowing whether the food you buy is wholesome and must depend upon the Food and Drug Administrations of Federal and State Governments to insure that not only you but your neighbors do not become a focal point for disease by reason of poisonous substances and malnutrition. You are not in a position to bargain with the agent of the railroad company as to a proper fare for your travel from one point to another and you have no way of ascertaining whether or not the equipment of the road is safe for your travel. You must depend upon someone else, and certainly you feel safer to have a disinterested body regulating such matters than to be compelled to depend upon the good faith of the particular railroad with whom you may be dealing.

Government regulation is a good and an important thing in the economic and legal fabric of our lives, but it is highly important that every citizen know what is regulated and why. Under-regulation and over-regulation are equally vicious evils. It would be impossible, save for the strong and the ruthless, to live in a society without regulation, and inevitably

those strong and ruthless individuals would become regulators in any unregulated society, which is but to say that society cannot exist without regulation.

In this country the pendulum has been swinging to the side of over-regulation. We have become mentally fat and lazy. Liberty has become an abstraction, a pretty word, a thing to be expected like air and water, free for the asking. The man trapped in the mine shaft soon learns the value of air, the desert wanderer, far from the oasis, his throat parched, his tongue swollen and his eyes staring, learns that water is a pearl of great price. A people who have permitted liberty to slip from their grasp soon learn, as we are about to learn, that something very precious has been lost in the tangled maze of Government regulation, and the wolfish fighting and slashing for individual and class advantage by a people who have forgotten that the Golden Rule is a way of life and not a religious dogma.

I am not very optimistic about the immediate outcome of the growth of regulation of business by Government in the last half century because I seriously doubt that the average American citizen, pampered and lulled into a sense of security as he has been, has sufficient interest to be aroused or sufficient mental stamina to do those things which must be done if we are to retain the fragments of liberty remaining and to regain the heritage our forefathers left us which we have frittered away.

Whether or not we have reached a state of over-regulation may be a matter of opinion, but no one can deny that our trend has been toward over-regulation.

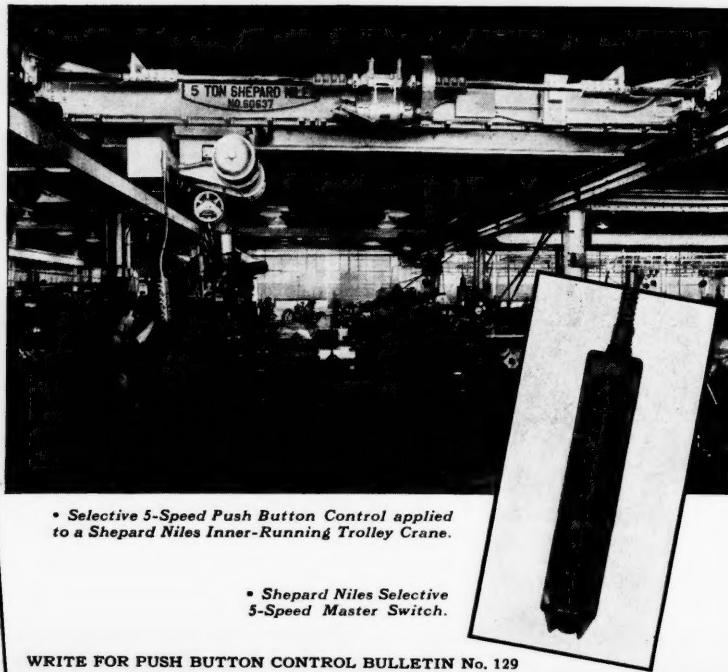
(Continued on page 70)

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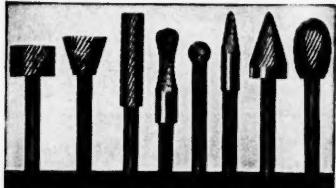
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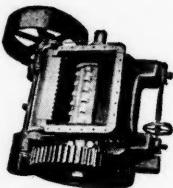
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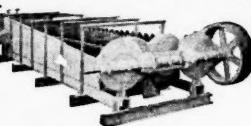
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Natural Gas Companies Report Gas Engine Use by Industry Doubled Since 1936

(Continued from page 29)

to this method of engine operation," the Committee reports on 46 natural gas engines (varying in size from 40 to 250 horsepower) which were observed over periods of from 12 to 18 months of operation at cooling water temperatures from 215 to 230 degrees F. These engines were periodically inspected during operation and subsequently torn down for detailed micrometer inspections. Further, dynamometer tests were conducted on engines equipped with convention (160° F.) cooling units, then rechecked after being cooled at 212° F. It is reported that: (1) dependability has been as good in all cases, and in many instances better, than engines operating at lower cooling water temperatures, (2) oil consumptions have been no greater, (3) cylinder wear has been normal, and in some cases phenomenally low, (4) piston rings were entirely free and clean, (5) engine head gaskets of standard materials have held perfectly in all cases, (6) bearings were in excellent condition, (7) condensation (water in oil sump) was entirely eliminated.

HEAT RECOVERABLE PER B.H.P. (ACTUAL LOAD) PER HOUR

	Actual Engine Load (% of Rated Capacity)		
	100	75	50
Btu. recoverable per brake horsepower hour.....	5,000	5,700	7,300
Lbs. of steam at 5 lbs. per sq. in. gauge from water at 70° F	4.15	4.74	6.07
Gallons water at 180° F from water at 70° F.....	5.46	6.22	7.96

NOTE: Full load is based on 70 lbs. per sq. in. B.M.E.P.

nated, and (8) dynamometer tests showed a slight increase in engine horsepower under full load conditions with the same quantity of fuel, indicating possible reductions in "oil drag" at higher cooling temperatures.

As a result, the Committee feels that "it is now possible safely to advocate the use of high-temperature-cooling wherever waste heat may be utilized to advantage in conjunction with the operation of a natural gas engine." The advantages of waste heat recovery through the "high-temperature-cooling" method include: (1) the ability to recover approximately 50% of the heat value of the fuel (in addition to the 25% converted into useful work), (2) waste heat recovery both from jacket water and exhaust gases without upsetting the balance in the engine cooling sys-

tem or affecting the temperature differential in the engine itself, regardless of variation in operating conditions, (3) automatic compensation for fluctuations in external heat demand or engine load, without attention or adjustment by plant operator.

The quantity of heat obtainable under various engine load factors, utilizing the heat from the engine jacket water and the exhaust gases, has been tabulated as follows for the assistance of those contemplating "high-temperature-cooling waste heat recovery systems":

In this connection the Committee comments: "It is readily apparent that through the use of a simple dependable and automatic method of waste heat recovery, the field of application for natural gas engines is infinitely broadened."

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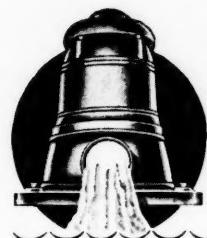
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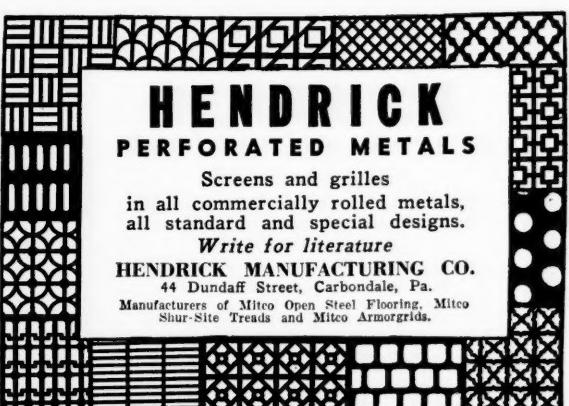
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Modernizing Living Conditions in a Coal Mining Town

(Continued from page 39)

houses, located near Wheelwright, and formerly owned by an operating company now out of business, was acquired by the Inland Steel Company early in 1940.

This town was completely reconditioned, and the same kind of sanitary improvement program, except of course on a smaller scale, was also carried out there. Water, sewer and gas facilities were provided for all houses as at Wheelwright.

Many unsanitary and unsightly open surface drainage ditches were done away with by installing underground storm sewers and drain pipes.

A general clean-up campaign was carried on which required a large force of men and trucks. Creek channels were cleaned out and debris and trash of every

sort were moved from around and under houses and throughout the town generally.

At this time no specific figures or data can be given to indicate the degree of reduction in disease or sickness frequency because of these improvements, but we do know Wheelwright and Burton will be healthier towns, and it is a foregone conclusion that the result will be less sickness. A careful check is being made which, after a period, will undoubtedly indicate an improvement.

The improvement of the living conditions of the employees, in our opinion, will result in better satisfied and more efficient workmen which should be reflected in a better safety record. Labor turnover should be reduced to a minimum because with more pleasant, comfortable and sanitary home surroundings, the worker and his family will be less inclined to move away. The improved sani-

tary conditions and greater cleanliness of the town generally induce a greater interest on the part of the tenant towards keeping his home and its surrounding grounds clean. This was manifested soon after the program was well underway by a pronounced activity on the part of householders to "clean up" around their homes. Such a program so obviously demonstrates the Company's interest in its employees and their families' welfare that we feel friendlier relations between the two are promoted.

The completion of the entire program required the expenditure of a large sum of money, no part of which was subsidized in any way by a governmental body.

The Inland Steel Company expects to operate its plant at Wheelwright for fifty years, and it feels what has been done in modernizing its house plant and improving the standards of living of its employees is good business.

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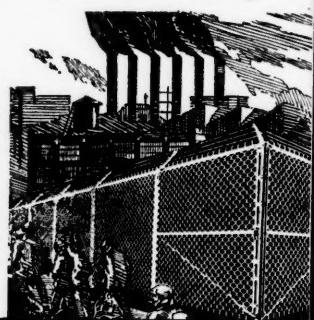


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Government Regulation of Business

(Continued from page 64)

This trend can be effectively stopped if a majority of the adult individuals in the country will make it their business to know something about every regulatory body, to know the reasons why it was set up, what it does and why it continues, to cease thinking about the various commissions, boards and bureaus as an unintelligible hodge-podge of the alphabet, and to know them for what they are. Today the average citizen is too lazy to pronounce the real name of a regulatory agency. He says AAA instead of Agricultural Adjustment Administration, sometimes not even knowing the name in full, let alone knowing its functions and purposes.

When a four-year-old child doesn't understand a situation he asks questions. If he doesn't understand he asks the question again, and repeats the process until he has secured the right answer or his mother has lost her patience, closing off his source of information. We have become childlike in our willingness to let someone else provide for us and protect us, regulating and regimenting our daily existence. I would suggest that if we would become childlike in another sense and adopt childhood's persistent inquisitiveness, we would soon learn to know our Government as it exists today and we would again return to a proper balance between Government and business, assuring the retention of social gains which can only come from the productiveness of business and assuring the recapture of liberty, saving ourselves from the fate of Europe.

Lunkenheimer Elevates Burdorf and Rhame to Board of Directors

Harry A. Burdorf and Frank P. Rhame, vice presidents of the Lunkenheimer Company, Cincinnati, Ohio, were elected to the board of directors at the annual stockholders' meeting February 27. Mr. Burdorf, who has been with the company since 1905, is Vice President in charge of sales, and Mr. Rhame, who has been associated with the company since 1919, is Vice President in charge of sales engineering. Both are well known in industrial and business circles.

Affleck Awarded Honorary Membership in American Concrete Institute

B. F. Affleck, retired, former president of Universal Atlas Cement Company, Chicago, Ill., was awarded a certificate of honorary membership in the American Concrete Institute at its thirty-seventh annual dinner in Washington on February 19. Only twelve people have previously been selected for honorary membership which, according to the by-laws of the Institute, is conferred upon "a person of eminence in the field of the Institute's interest or one who has performed extraordinarily meritorious service to the Institute." Mr. Affleck attended the first convention of the Institute in Indianapolis in 1905, and has taken a continuous active interest since then, serving two terms on the Board of Directors.

Pittsburgh Plate Glass Opens Charlotte Office

W. I. Galliher, Director of Sales of the Columbia Chemical Division, Pittsburgh Plate Glass Company, Pittsburgh, Pa., announces the opening of a chemical sales office at 615 Johnston Building, Charlotte, N. C. James R. Simpson, former Director of Duke University's Appointments Office, has been named District Sales Manager in charge of the Charlotte office.

Hendrick Manufacturing Company Opens Baltimore Office

To better serve its customers in the Baltimore-Washington area, Hendrick Manufacturing Company, Carbondale, Pa., has opened a sales office in the Hearst Building, Baltimore Street and Guilford Avenue, Baltimore, Md. The new office will be under the supervision of B. F. Gardner and will handle the complete Hendrick line, including perforated metals, perforated metal grilles, "Mitco" open steel flooring, "Mitco" shur-site treads, "Mitco" armor-grids and Hendrick mixers. For a number of years Mr. Gardner was at the Carbondale plant of the company.

Bastian-Blessing Distributor Expands

For the second time in four years, Grant E. Key, Inc., Lynchburg, Va., distributor for the Bastian-Blessing Company of Chicago, has moved into larger quarters to take care of a rapidly growing business. In the new Key showrooms and service headquarters at 702-704 Fifth Street, Lynchburg, there is said to be one of the finest displays of soda fountain equipment to be found in the South. For the convenience of druggists, the Key organization maintains showrooms and repair facilities in Charlotte, N. C., as well as at Lynchburg.

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